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Use of All-Helical-Gear Transmission Made Possible by New Equipment

By BURNHAM FINNEY

SILENT operation of gears in all speeds is a goal toward which automotive engineers have been working for years and which has first been achieved by the Chrysler Corp., Detroit, through the use of an all-helical-gear transmission in its 1933 Dodge, De Soto and Chrysler cars.

All transmission gears, even the first and reverse sliding gear, transmission countershaft gears and the transmission reverse idler gear, are cut with helical teeth. Second speed is constant mesh. The driving gear is in an integral part of the clutch shaft. The main shaft has helical splines, which result in easy gear shifting, and it operates on a ball bearing in the rear and a roller bearing in the front mounted in the main drive pinion. The countershaft gears are fitted with roller bearings, revolving on a stationary countershaft. Incidentally, helical splines are a new development in transmission design.

Parts making up the transmission are the main drive pinion, countershaft gear (four on a cluster), mainshaft second-speed gear, low and reverse sliding gear, reverse idler gear, sliding clutch ring mating with the sliding clutch gear and the transmission spline shaft.

The Chrysler Corp. has long been stressing improvement in quality as the outstanding development in its entire line of passenger cars. The new, quiet transmission as well as other features contributing to better car performance has been made possible by the use of high production machine tools and by scientific control over all manufacturing processes. Because machining costs on helical gears usually are higher than on other types of gears, this transmission could not have been put into Chrysler, Dodge and De Soto cars without employment of the latest type of gear cutting, chamfering and lapping equipment. It is an excellent example of

what plant rehabilitation has done in placing a company in a strong competitive position.

Accuracy Assured by Lapping

Perhaps the most interesting operation is the finishing of the gears after hardening on Fellows three-lap recess-type gear lapping machines, which smooth the contacting surfaces of the teeth and remove any possibility of fillet interference due to slight distortions from heat treatment. This operation, therefore, produces more accurate, longer-lived and quieter gears. Rapidity of lapping is a major advantage; correction of tooth shape and of the helix angle of the gears is another benefit.

The machine does not depend entirely upon the rotation of the work and laps to effect the lapping action, as there is a reciprocating movement of the work at a fairly high rate of

speed. This brings about an adequate distribution of the lapping compound over the contacting teeth, giving more efficient and more rapid lapping action. The spindle carrying the work is driven positively through change gears, the three cast-iron laps being rotated by the action of the work. A friction brake is applied to each of the three lap spindles, and the pressure can be varied to suit conditions, keeping the teeth of the laps in intimate contact with the work.

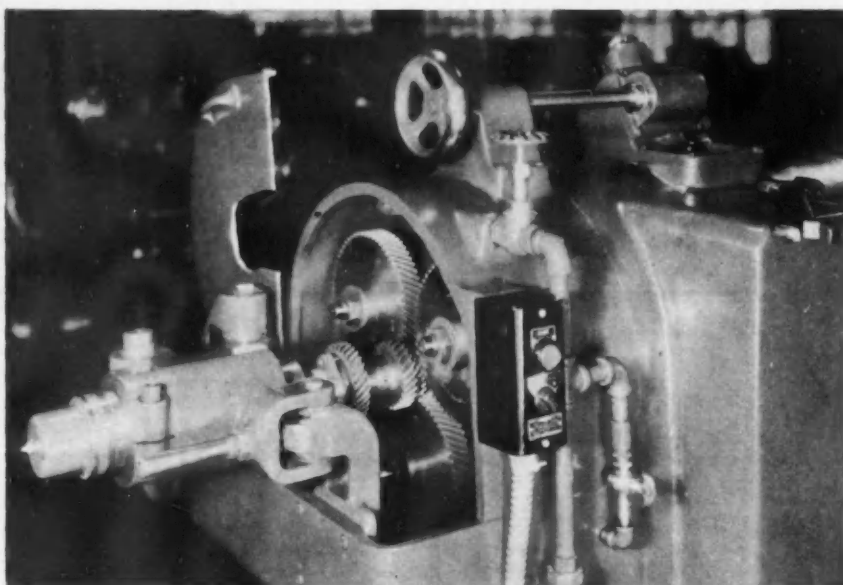
A special method is used to locate the gear in the lapping machine and to hold it on the arbor. The arbor consists of a hollow steel shell 16 in. long and 3½ in. in diameter, inclosing a steel spring. The arbor is locked in position by means of a rack and locking nut on the outside of the shell. The driving part of the mechanism is similar to a tang on a drill, the driver being composed of a bushing entering the gear hole and being located from the arbor. At the end of the bushing is a slot to fit the tang on the arbor for driving purposes. The bushing also has two pins which slip into four drive holes on the cluster gear when the machine starts.

One man operates three lapping machines. The lapping time averages 3 min. per gear (1½ min. on the drive and 1½ min. on the coast), depending on the number of teeth in the gear.

Teeth of Gears Chamfered

All gear teeth are finish cut on Fellows gear cutting machines with about 0.025 in. tooth thickness left for the finishing operation. The gear teeth are rounded on a Peerless gear tooth chamfering machine which has an independently-operated work-head, a geared-head reduction motor furnishing the power for revolving the work and eliminating all gearing and universal shafts in transmitting power from the main 1½-hp., 1725-r.p.m. motor located in the base. The spin-

DODGE, De Soto and Chrysler cars have an all-helical-gear transmission giving silent operation of gears in all speeds. Because the cost of machining helical gears usually is higher than on other types of gears, employment of this transmission has been made possible only through use of the latest type of high-production gear cutting, chamfering and lapping equipment. This article, describing the manufacture of these gears, shows what plant rehabilitation has done to place the Chrysler Corp. in a strong competitive position.



Gears are finished after hardening on Fellows three-lap recess-type gear lapping machines which smooth the contacting surfaces of the teeth and remove any possibility of fillet interference due to slight distortions from heat treatment. A special method is used to locate the gear in the machine and to hold it on the arbor.

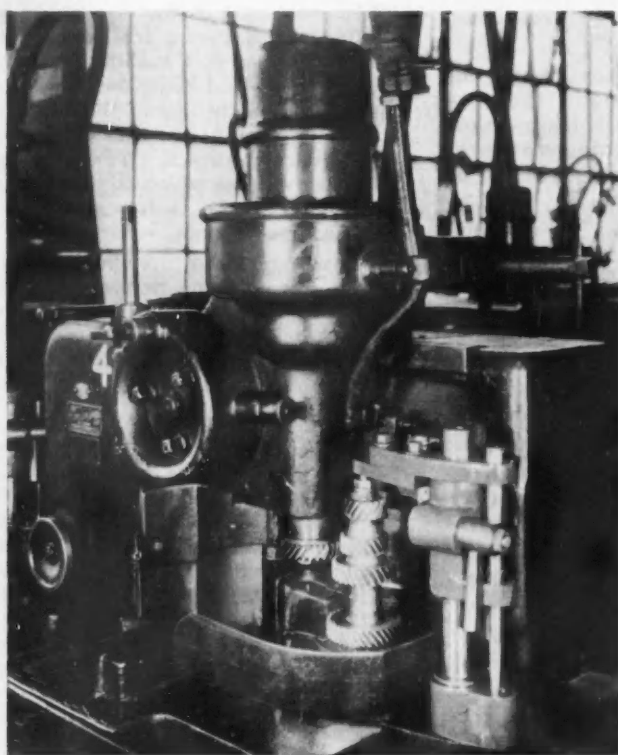
dle speed is 1800 r.p.m. A graduated work-base permits convenient and quick setting of work to the desired angle in relation to the cutter. The work spindle is a large cylinder of piston and sleeve construction.

The keyway of the hardened steel spline shaft, on to which the cluster of gears fits, is ground on a surface grinder equipped with a special head and special indexing fixture. The mechanism for generating the helix lead is incorporated in the index head. The work-table travels back and forth

against the No. 3860M Norton grinding wheel, indexing at the end of each stroke. The grinding of six keyways in each shaft is accomplished at the rate of 15 complete shafts an hour. The sides of the wheels are dressed at a positive angle at all times by a fixture on the spindle head of the machine. This angle is fixed and cannot be changed by the operator.



All gear teeth are finish cut on Fellows gear cutting machines. About 0.025 in. tooth thickness is left for the finishing operation.



The hole for the helical spline is broached in the gears on an Oilgear broaching machine, the adapter of which is mounted on ball bearings. When the broach is drawn through the work, it travels without turning, the adapter turning instead to conform to the contour of the helical spline. A similar process is used in machining the sliding clutch ring and sliding clutch gear, which fit into each other. The job is carried through from a single locating point. During rebroaching of the work to size after heat treatment, a special fixture is utilized which permits the gear to revolve while the broach spirals down through the hole.

A Heald Size-Matic duplex grinder is equipped with a special pin grinding chuck. The rollers on the chuck are made from spring wire 1/16 in. shorter than the face of the tooth, three of them which are the same size as the pitch pins being used on a gear.

Gears Undergo Careful Inspection

If gears are not right "in the green," they cannot be made right by being burnished or lapped. Therefore unusual care is taken with gears coming from the finish cutting operation to assure that all requirements have been met. They must pass through three rigid examinations: on a Fellows Red Liner, on a Fellows gear measuring machine, and on a Chrysler-designed running-in machine or speeder. All three of these ma-



Individual errors are measured to 0.0001 in. and less on this Fellows gear measuring machine, which checks the shape, spacing and eccentricity of helical gear teeth and the helix angle or lead of the gears. It also inspects guides on the Fellows helical gear shapers.

chines test the accuracy of the gears, but each in a different way.

The Red Liner gives all errors in combination, but in such a way that each error can be definitely located and its magnitude determined. It checks gears for eccentricity, tooth spacing and tooth shape in combination, both sides of the teeth being inspected at the same setting and in a single revolution. The test is made under conditions similar to that of actual operation. Cumulative errors in gears cause either velocity changes or variations in center distance; on the Red Liner the latter is employed. One center is flexibly mounted so that errors will cause the center to move toward or away from the fixed center. Through a multiplying lever and pen such movements are transferred to a constantly moving chart so that the errors recorded are in permanent form. Magnification is 200 to 1; the error in a gear of 0.001 in. would be indicated as a movement of 0.200 on the chart.

Another task for which the Red Liner is employed is to tell when gear cutters need resharpening. It indicates the surface condition of gear teeth as they are left by the finish cutting tool. If the cutter has become dull, the Red Liner records the roughness of the tooth surface. Through these tests the Chrysler company has learned approximately how many gears a tool will cut before it must be resharpened.

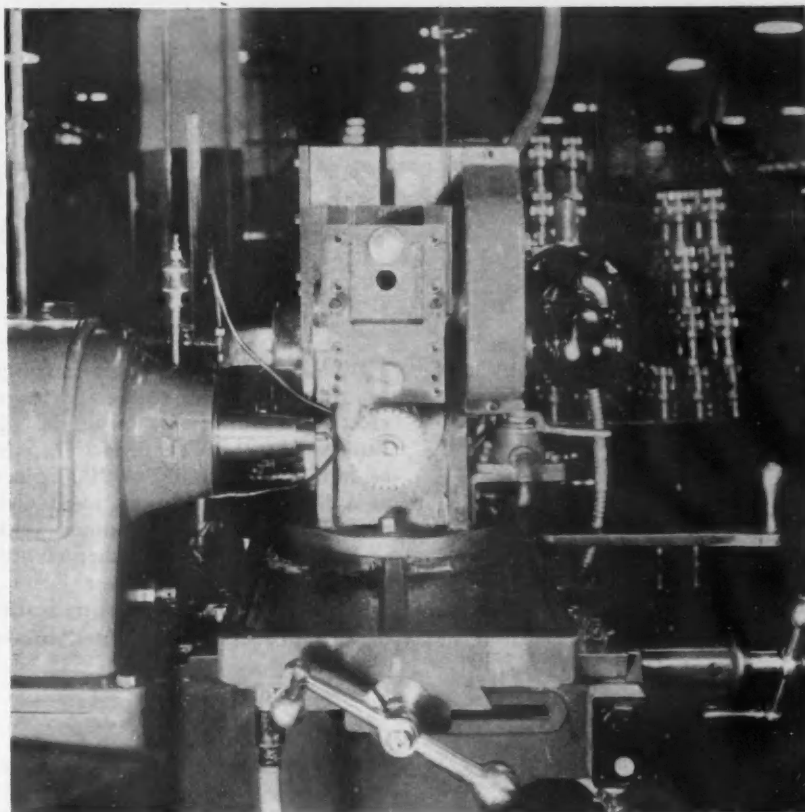
Gears are again checked on the Red Liner after hardening to see whether the hardening operation has materially changed conditions. If the distortion is too great, the gears cannot be put through on the regular production basis, but must receive further treatment.

Gear Measuring Machine Also Employed

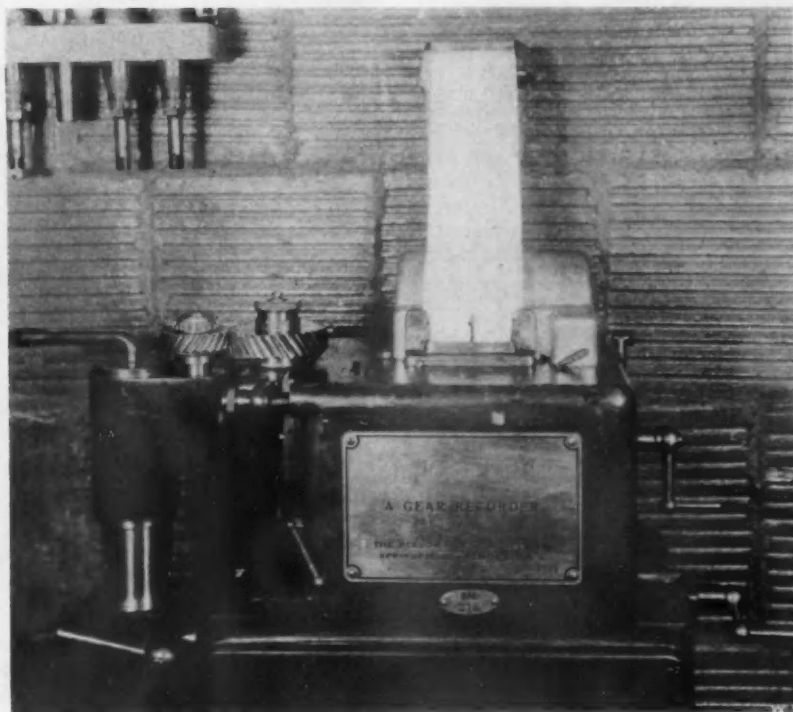
Whereas the Red Liner checks errors in combination, the Fellows gear measuring machine checks them individually. The function of this machine is more in the nature of investigation than as a production unit. In other words, if experience shows that certain modifications are necessary on the gear tooth, the machine will determine whether these modifications have been obtained to limits as close as interchangeable production methods can make them. It measures errors to 0.0001 in. and less. The machine does more than check the shape, spacing and eccentricity of helical gear teeth and the helix angle or lead of the gears; it is also used to inspect the guides used on the Fellows helical gear shapers.

Gears Tested for Noise

Gears are inspected for noise and to determine whether bearings are in the proper locations and heights on the running-in machine. The machine is lined up with two hardened and ground helical master gears which
(Concluded on Advertising page 16)



Gear teeth are rounded on a Peerless chamfering machine.



Gears are checked for eccentricity, tooth spacing and tooth shape in combination on the Red Liner. This machine is also used to tell when gear cutters need resharpening.

Copper-Hydrogen Welding

AS is probably true of any new and unusual process, hydrogen electric welding has come in for its share of misunderstanding, particularly as it has been in private use by a few large firms, and but little authoritative information about it has been published. Copper-hydrogen electric welding, to call it by its full name, is the welding of ferrous metals by passing them through a hydrogen-filled, electrically-heated zone at 2100 deg. F. Here the copper, which has been applied to the seam, alloys with the iron to form a continuous gas-tight bond. This bond has been proved to be stronger than the steel itself.

To most readers the pieces of iron or steel might seem simply soldered or "pasted" together by the molten copper. Actually, however, the iron and copper alloy together. Some of the copper goes into solid solution in the steel and some of the iron is dissolved by the copper, to produce an integral copper-iron alloy bond between the parts. This alloy is approximately 97 per cent iron and 3 per cent copper. Under normal conditions no free copper remains be-

*This furnace was described briefly in THE IRON AGE of Oct. 6, 1932, page 536.—Ed.

PRODUCING a joint stronger than the steel, copper-hydrogen electric welding is done at the Bundy plant in a furnace capable of handling as many as 1000 pieces at a time. In addition, each piece may involve a dozen or more welds, and a car of welded parts is discharged from the furnace every 4 min. The nature and application of this process are outlined in this article.

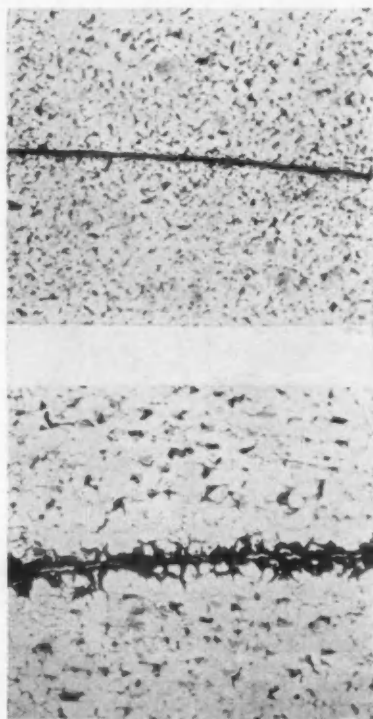
tween the parts. Perhaps the best proof of this fact is that the alloy which forms the weld has a melting point practically the same as that of steel. Previously welded parts may again be passed through the welding furnace with no effect whatever upon the weld. The accompanying photomicrograph (100 x) shows clearly how the alloy (indicated by the black areas) extends across the seam into the grain structure of the steel and completely surrounds many of the individual grains.

As this process is accomplished with no external application of metal, the weld is hardly perceptible, so that

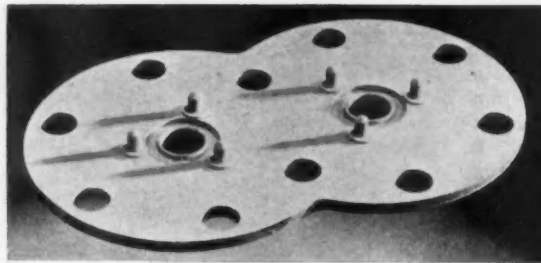
a natural question which arises upon examination of a hydrogen welded part is: "Just how strong are these welds?"

A number of tensile, compression, shearing, and bursting tests have proved that they are stronger than the steel itself. For instance, a steel tank assembled from a length of tubing, two stamped end-plates, and a screw-machine threaded fitting, with all joints hydrogen welded, burst at 2200 lb. hydraulic pressure, but there was no failure of the hydrogen welded seams at any point. In a series of tensile tests using pieces of $\frac{1}{2}$ -in. bar stock which had been cut apart at a 45 deg. angle and reassembled by hydrogen welding, the steel itself pulled apart at stresses as high as 66,000 lb. per sq. in., but the welded joints remained intact. These are only a few of the many tests which the process has successfully undergone.

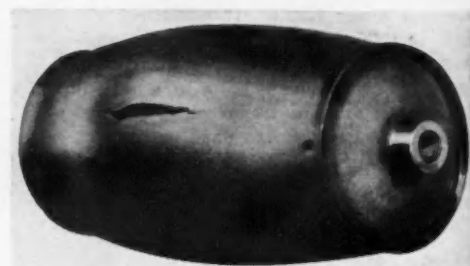
One of the salient points in connection with the process is that hydrogen electric welding is welding on a quantity production basis. The huge Zeppelin-type furnace at the Bundy Tubing plant* is capable of handling as many as a thousand pieces at one time, size being the



THE photomicrograph at the top shows a section through two pieces of steel ready to be welded. Note the sharply defined cut through the grain boundaries. The lower photomicrograph shows the same seam after welding. The copper-iron alloy (black area) now extends well into the grain structure, and the sharp line of the seam has disappeared.



STUDS in this compressor cylinder-head hold down a valve assembly and therefore withstand considerable torque. In the original design they were soldered at the back and had a tendency to loosen and turn under stress. They are now copper-hydrogen welded in place and will twist off before loosening.



ALL parts of this steel tank, made up of a length of tubing, stamped end-plates and a screw machine fitting, were assembled by copper-hydrogen welding. Hydraulic pressure of 2200 lb. distorted the tank and split the tubing, but had no effect on the welded joints.

A Quantity-Production Process

By W. W. ANDERSON

President and General Manager
Bundy Tubing Co.

only limiting factor. Each of these pieces might involve a dozen or more welds. As the furnace discharges a car of parts about every 4 min., and is capable of 24-hr.-a-day operation, its economies are comparable to those of any other automatic quantity production process. However, there are other economies—important savings in material and labor involved in producing the integral parts to be welded. Simple changes in design to adapt the product to hydrogen welding often provide not only better appearance, cleanliness, lighter weight and greater strength, but also much lower cost.

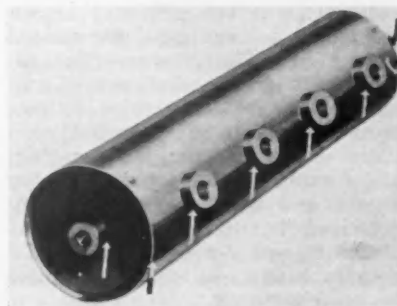
Permits Intricate Assemblies of Stamped and Drawn Parts

As the accompanying photographs show, with the use of hydrogen welding, it is often possible to eliminate such expensive parts as intricate castings and forgings, and replace them with inexpensive stampings, drawn shapes, bar stock, screw-machine products, etc. A header for a multiple refrigeration installation, assembled by hydrogen welding from a length of tubing, stamped end-plates, and screw-machine fittings is the simplest sort of assembly, yet takes the place of a whole network of copper tubing and expensive brass fittings. Small crankshafts, camshafts, spring shackles, levers, etc., which would ordinarily be machined from forgings,

may be assembled by hydrogen welding from the simplest and least expensive of integral parts.

Still another economy results from the cleanliness of the welded objects when they leave the furnace. Being not only welded but also cooled to practically room temperature in a reducing atmosphere, they emerge clean and free from scale or oxides both inside and outside. This is of special advantage in the case of such inclosed objects as tanks, headers and

an indication that this process is taking its place as a standard production method. The process has many possibilities; practically every prod-



A STEEL header assembled from tubing, stampings and screw machine products. All welds are made in a single passage through the welding furnace

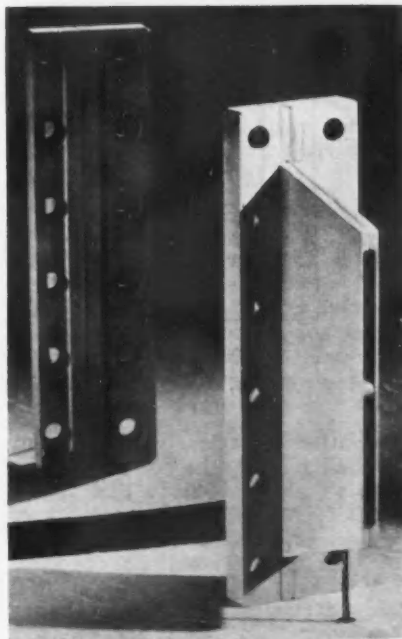
uct manufactured on a quantity production basis has some iron or steel part to which hydrogen welding could be applied.

Chromium Plating with Fluoride Agent

A notable paper on chromium plating is obtainable in pamphlet form from the Rensselaer Polytechnic Institute, Troy, N. Y. It is bulletin No. 39 of its engineering and science series and was written by Alfred Perlenfein.

The author finds that a chromium plating bath with chromic acid and sodium fluoride as an addition agent is feasible. The optimum conditions are a concentration of 250 gm. of chromic acid per liter and 10 gm. of sodium fluoride per liter, a temperature of 45 deg. C., and a current density of 15 to 65 amp. per square decimeter. An impervious plate directly on iron was made at a current density of 31 amp.

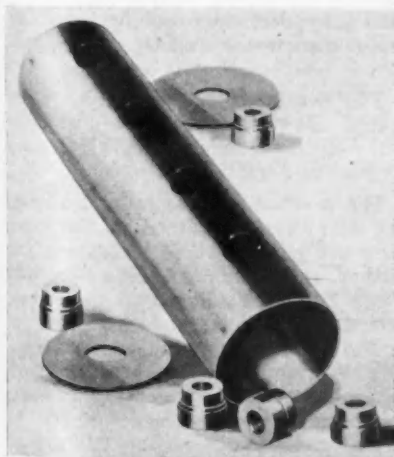
The fluoride bath is urged as better than the sulphate bath because it offers a wider plating range; permits the use of higher current densities, which give better efficiencies; gives a brighter plate, and will plate more quickly because of the higher current densities. The paper includes a fairly extended sketch of the history of chromium plating.



INTRICATE type-casting machine parts can be easily assembled by hydrogen welding. The two machined halves have been pinned together to assure perfect contact. The weld is over the entire area of contact

floats where a cleaning operation after welding would be difficult, if not impossible.

The fact that several of the country's largest manufacturers are redesigning their products to adapt them to copper-hydrogen welding is



INTEGRAL parts required for assembly of a header by means of copper-hydrogen welding. These parts are assembled by a snug fit, and copper is applied at or near each joint before entering the furnace

Making Steel of a Uniform Quality

By LEWIS B. LINDEMUTH

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THIS discussion is about the quality of steel in ingots. It outlines a procedure by which the average quality can be improved, or rather, a method of preventing many of the uncontrollable factors from adversely affecting an already frequently attained quality.

It is generally recognized that manganese in an open-hearth charge is beneficial; it is also generally known that blow-holes and pipe are related in some quantitative way. The establishment of these relationships, and a means for utilizing them follow: As no two plants have identical conditions of raw materials for charging, rate of oxidation in the furnaces, slag volume, and other factors affecting oxidation, it must be realized that definite figures for one plant would probably have to be modified to meet the corresponding circumstances of another. These things are applicable in some modified form to all grades of steel made by any one of the commercial processes.

The first information regarding the relationship between pipe and blow-holes, and the thought that they could be controlled, was published in 1902. An investigation, begun in 1911, resulted two years later in the systematic use of manganese ore in the open-hearth part of the duplex process making alloy steels. A few years later another duplex plant adopted nearly the same procedure for rail steel, and more recently higher manganese pig iron has become standard for many basic open-hearth plants.

The relationship between pipe and blow-holes, and the means of control, supplied the information essential to the reason for, and the quantity of, manganese to be used. As it is in itself useful knowledge, it is described in some detail.

Works Do Not Keep Sufficient Records

There are, of course, conditions other than the quality of the steel in ingots which affect rolling properties, such as, temperature of rolling, uniformity of rolling temperature throughout the ingot, length of time in the soaking pits, the condition of the surface of the ingot molds, and others. These things sometimes obscure results and lead to erroneous conclusions. It is unfortunate that steel works generally do not keep records in the steel-making departments of those important factors relating to quality and ultimately to the cost of finished products. When some infor-

mation is desired it is generally the procedure to conduct a special investigation with heats made under special observation, with special care, special records, and everything connected with them out of the normal. Such heats are seldom representative and conclusions based upon them often do not apply to normal production.

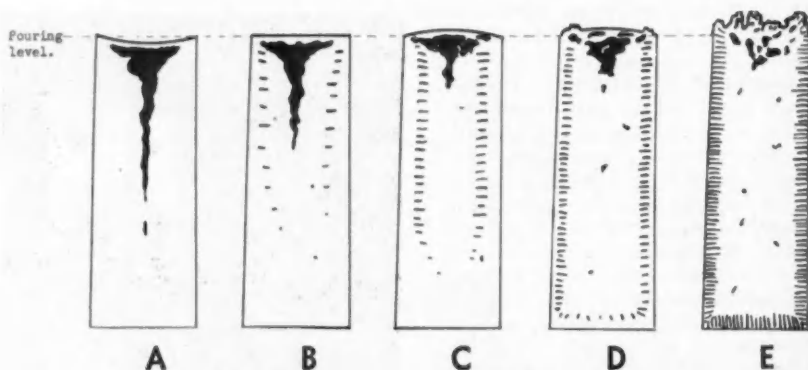
The information upon which this article is based is from several years of daily production, the heat sheets being so arranged that the necessary things were recorded. All grades of carbon steels were produced in the interval, and many of the S.A.E. and Ordnance alloy steels. The conclusions have been tried under widely varying conditions of charges and raw materials. I have never found that where the anticipated amount of

relative quantitative deoxidizing effect of manganese, silicon and aluminum to be in the proportion of 1, 17.3 and 90 respectively.

The relationship between pipe and blow-holes is approximately definite for all grades of steel except that known as "rimmed." It varies slightly between grades, and slightly between ingots of different size and proportion, and considerably between heats of any grade, ingots of any size or proportion, if there are wide variations in pouring temperature.

Top Surface of Ingot Reveals Internal Structure

The relationship between the appearance of the top surface of the ingot, whether concave, flat, convex, or boiled up, is a remarkably accurate indicator of the internal structure of the ingot with regard to pipe and blow-holes, provided the top surface has not been retarded in freezing over, either in spots or in its en-



Types of steel ingots as regards the relation of pipe, blow-holes and top surface.

deoxidation is previously provided for, the quality or the proportions of the materials charged into a basic open-hearth furnace affects the quality of the steel produced so long as the normal open-hearth reactions can proceed without interruption and provided no foreign harmful metals are introduced.

In the *Journal of the Iron and Steel Institute*, 1902, No. 1, an article, "The Influence of Chemical Composition on Soundness of Steel Ingots" describes a comprehensive work by Brinell. Brinell observed the relationship between piping, the number and location of blow-holes, and the appearance of the top surface of the ingots as an accurate indicator of the former. He contended that the characteristics of the pipe and blow-holes are dependent upon the content of silicon, manganese and aluminum in the steel. He further determined the

tirety, by dirt or fused brick which has floated to the surface after pouring.

The accompanying sketch of split ingots shows this relationship in a more or less composite of all grades of steel in normal sized molds.

The amount of manganese, silicon and aluminum contained in the steel does not control these relationships. Rather, the amount of these elements which had been added and were consumed in deoxidizing do not remain in the steel as metallic constituents. The same applies to the equivalent of any other elements which might have been used in their places.

The proportional deoxidizing power of aluminum, manganese and silicon as determined by Brinell has been accepted as correct.

The ingot type represented by "C" is the most economical for most pur-

poses because it requires the least discard for pipe (about 15 per cent) consistent with locating the blow-holes sufficiently far under the surface to prevent their becoming a source of seams. The blow-holes are in such a position that their walls cannot become oxidized and will therefore weld in rolling or forging.

Type "A" contains up to, and sometimes exceeds 60 per cent pipe, and frequently secondary pipe, depending largely upon the pouring temperatures.

Type "E" has boiled up violently. There is a top sponginess rather than a true pipe. The blow-holes are large and cover the entire area of the surfaces of the ingots. Their outer extremity is in contact with, or open to the surfaces. Such ingots crack badly in rolling and the blow-holes cause innumerable small and large seams. So-called "semi-killed" steels approximate this type.

Type "B" and "D" are intermediate between "A"—"C" and "C"—"E," respectively. There are, of course, all degrees of ingot structure, the sketches being typical of distinct steps between excessive pipe, with no blow-holes, to excessive blow-holes with little true pipe.

To Produce Ingots of a Desired Type

To produce a uniform type of ingot under the variable conditions of oxidation it is necessary to complete the deoxidation to the desired point with a deoxidizer, such as aluminum, added in the molds while pouring. To control the amount added, units of the deoxidizer of convenient and uniform weight should be provided so that the pitmen can make additions by the number of pieces. A $\frac{1}{2}$ -oz. pellet of aluminum is a satisfactory size.

The steel in the ladle as it is delivered to the pouring platform should have had the silicon or its substitute added only in sufficient quantity so that, if no further additions are necessary, type "C" or "D" would result. The first several ingots have an arbitrary number of pieces of aluminum added, as experience would indicate. By the time that two or three ingots have been poured, their action will have progressed sufficiently to determine from them the number of pieces which will be required for the remaining ingots.

Any dirt or patches of fused material which appear on the top surfaces of the ingots must be moved to the edge so that they will not retard the chilling over of any part of the top surface. A wooden stick is the best tool for this purpose. This is an essential proceeding. The metal which has been poured into the ingot mold must remain within the dimensions of the intended ingot size. The volume of the blow-holes as they are formed forces fluid metal of equal volume into the shrinkage cavity as it is formed. If, however, the top surface has not sufficiently solidified to resist the pres-

AS the persistent exponent of the scientific handling of the steel-making process, Mr. Lindemuth here contributes a logical continuation of the articles from him appearing in these columns last August. His discussion this time centers on methods of securing the steel desired, by nullifying, for one thing, the adverse effects of uncontrollable factors, factors which need only to be enumerated to be recognized. The author's observations are made in the light of records of daily production over a number of years.

A second part of the article will devote itself particularly to the deoxidizing phase of steel making. In delving into this little understood question, the author gives the billet chipping costs for heats of 10,000 tons of a high-class steel, showing how such costs rose with increased use of deoxidizers.



sure so produced, the still molten metal will be forced through the top, "boil up," and the pipe cavity instead of being reduced will form as in the case of type "B" ingots but with blow-holes in excess of type "C."

A very small quantity of aluminum can materially alter the characteristics of an ingot. As little as one ounce per ton of steel will cover a range of as much as four of the types shown in the sketch.

A Measure of Oxidation

By producing ingots of a uniform type, intermediate between the extremes shown, there is a definite end point to which deoxidation has been effected. With all controllable conditions identical, the amount of deoxidizers used in arriving at this state must be an indicator of the amount of oxidation. It would be expected that, with deoxidation carried to a uniform and definite degree of completeness, uniform and definite rolling properties and quality of product would result. *Deoxidizing to a uniform and definite degree does not produce steel of uniform rolling properties or quality.* A relationship does exist between quality and rolling properties and the amount of deoxidizers necessary to produce a uniform degree of deoxidation. *The greater the quantity of deoxidizers necessary, the poorer the quality of the steel.*

Some proportion of the effective deoxidizers added must have been consumed in reactions with the slag. Slags, however, which have a strong tendency to oxidize the deoxidizers have also the same tendency to oxidize the steel, so that conclusions need not be affected by these slag reactions.

The total amount of deoxidizers added and oxidized, calculated to the equivalent of manganese, using Brinell's figures for the relative effectiveness of manganese, silicon, and aluminum, indicates that seldom less than the equivalent of 1 per cent, generally about 1.50 per cent, and sometimes as much as 2.50 per cent manganese is necessary to effect a definite degree of deoxidation.

The question of deoxidation will be discussed at length in the concluding part of this article.

Corrosion Loss of Iron and Steel

World losses of iron and steel by corrosion and by wear and tear have again been discussed by Sir Robert A. Hadfield, the indefatigable British metallurgist, famous among other things as the inventor of manganese steel and transformer steel. In 1922 in a paper read before the Institution of Civil Engineers on "Corrosion of Ferrous Metals" he stated that the yearly loss by corrosion was probably no less than £700,000,000 sterling. In an article in a supplement of the *Times*, of London, of Jan. 28, he suggested that the total monetary losses must reach between £500,000,000 and £700,000,000 each year.

The loss due to wastage in 1932 he puts at 67,000,000 tons, or some 19,000,000 tons in excess of the actual production for that year. At the beginning of 1931, he adds, it was estimated that the world's stock of iron and steel in use was about 1,200,000,000 tons. The world, he asserted, has literally been starving itself of iron and steel and "this state of affairs cannot continue indefinitely."

Iron Consumption for Electrical Power Supply

The amount of iron required to generate and distribute electrical energy is estimated at 60 tons for each 1000 kw. by Sir Robert A. Hadfield, who discussed the use of steel in the world in a supplement to the *Times*, of London, Jan. 28. He puts the total amount now in use as between 5,000,000 and 6,000,000 tons. During the peak year of 1929, it is estimated that the world used 300,000,000,000 kwhr. of electrical energy, of which 125,000,000,000 kwhr. were consumed in the United States. On the score that the world consumption might be regarded as equivalent to the total capacity engaged for 3000 hr., the total capacity would be 100,000,000 kw. Thus with 100,000 units each of 1000 kw. and 60 tons of iron required for each 1000 kw., we would arrive at the 6,000,000 tons mentioned by Sir Robert.

Rustless Steel Employed In Fan Construction

By M. S. KICE, Jr.

Assistant Chief Engineer
American Blower Corp., Detroit

IN the previous article, centrifugal fans were classified according to the shape and rotation of the blades in their wheels. From a construction standpoint, they may be classified in another manner, namely, as to their size and weight. There is no particular relation, however, between the first and second classifications. For example, the old style paddle-wheel fan, usually thought of as a heavy fan, quite often is made very light for light duty. The multi-blade fan having a number of smaller curved blades can be made as heavy as any duty demands even to cast rustless steel blades.

Fans classified according to size and weight may be subdivided into light, medium and heavy. Fans with wheels somewhere between 3 and 6 ft. in diameter may be called light when they are made of No. 14 to No. 12 gage material; medium when they are made of No. 10 to No. 8 gage material;

and heavy when $\frac{1}{4}$ to $\frac{1}{2}$ -in. plate is used.

The pressure the fan produces does not determine mainly how heavy it is to be made when rustless steel is employed. The housing is sufficiently strong to resist any bursting pressure or collapsing suction this type of fan can produce. Likewise, a wheel can be made of light gage material, and still run to very high speeds. When the fan handles clean, cold air, metal gages are selected largely with a view to eliminating vibration.

Thickness of Material Affects Life of Fan

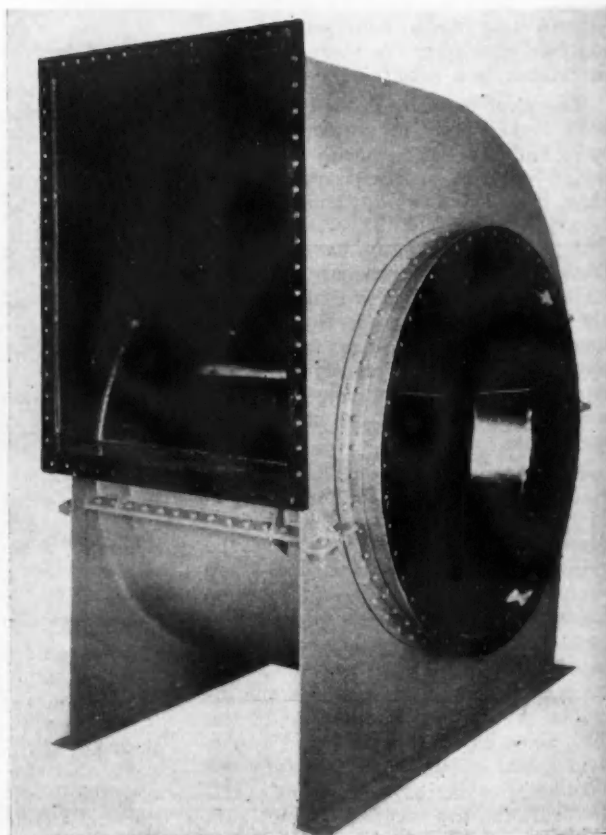
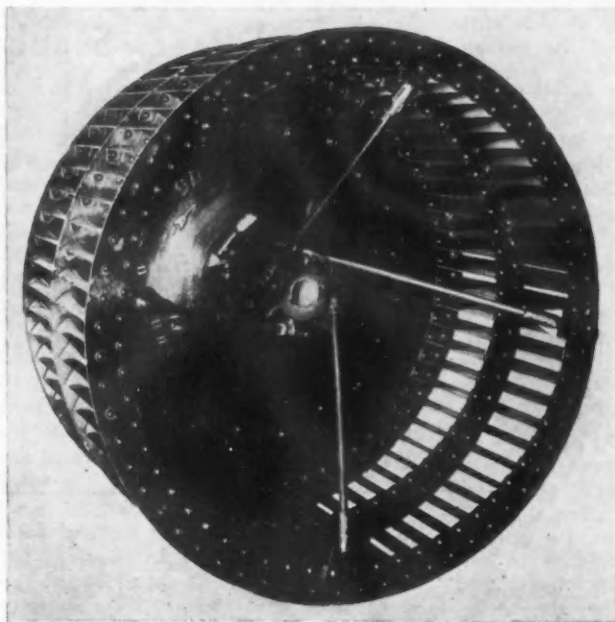
It is the kind of atmosphere the fan moves that determines the thickness of its plate. Where a corrosive

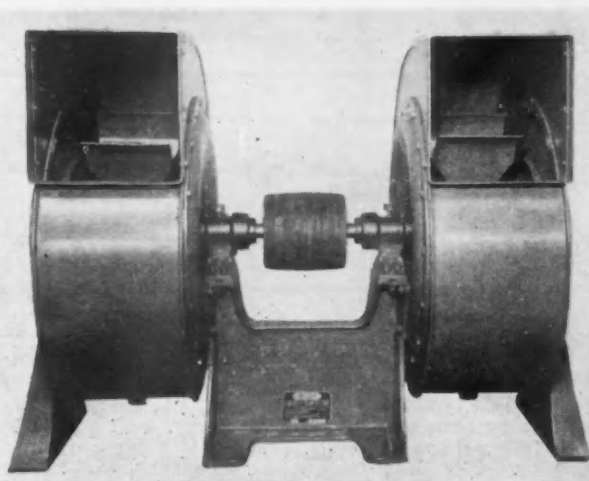
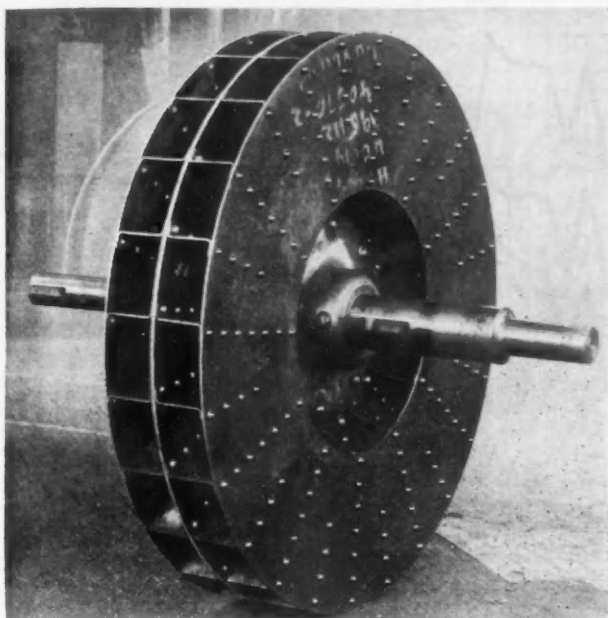
gas is involved, for example, the life of the fan is about proportional to the thickness of its parts, as well as to the effectiveness of the alloy selected to resist a given reagent. To a less extent, the life of the fan is proportional to the thickness of the parts where abrasive-carrying gases are involved, because the surface or skin of the metal has a longer life per unit of thickness than the center of the metal. The same is more or less true for the parts of the housing exposed to elevated temperatures, where scaling is the determining factor in the life of the fan. It has been found, however, that there is no commercial workable alloy that resists the abrasive action of materials such as coke breeze, fly ash, etc., more effectively than mild steel.

If the proper material is selected a rustless steel fan made of No. 10 or 12 gage material for handling corrosive gases will last about as long

THIS Sirocco fan, (at right) designed for 1000-deg. F. operation, has a rustless steel wheel and a $\frac{1}{4}$ -in. steel plate housing. Welding was employed in the housing construction.

Sirocco fan wheel made of rustless steel for operation at 1200 deg. F.





Beaded rustless steel fan built for the tobacco industry (above)

Radial wheel designed for maximum-pressure high-temperature service.

as a fan made of $\frac{1}{4}$ or $\frac{1}{2}$ -in. mild steel plate.

Another very important detail of a centrifugal fan, as well as of other machinery, is the construction of its shaft and bearings. The size of the fan shaft is not selected on the basis of strength alone, but also to eliminate vibration. If a wheel is hung from a good stiff shaft the critical speed of which is 15 to 35 per cent above the maximum operating speed of the fan, and if the wheel is given a reasonably good static balance, and further, if the bearings are on substantial foundations, there will be no noticeable vibration produced when the fan is operating at any speed from no-speed up to full speed. This is true though the fan wheel is repaired and balanced on the job. Generally, such a wheel will not have to be given a running balance. A static balance will suffice.

Excessive Heat from Too Large Bearings

Carrying the size of the bearing, however, to the large extreme is not good engineering, because after the shaft and bearing is large enough to avoid the first critical speed, any larger bearing and its accompanying shaft through the bearing, is rubbed at an unnecessarily high speed. A sensible limit of shaft speed in the bearing is 35 to 40 ft. per sec. Where anti-friction bearings are used, they likewise, if too large, will produce excessive heat.

Shafts of fans handling gases at elevated temperatures should be allowed to "float" at the end opposite the drive. By this is meant the bearing adjacent to the drive should be of the "fixed" type to prevent any longitudinal movement of the shaft. This assures smooth operation of the flexible or hydraulic coupling between the fan shaft and the driving unit. The other end should be allowed sufficient

longitudinal movement to accommodate expansion or contraction due to any temperature change in the shaft. Some shafts expand as much as $\frac{1}{2}$ in.

Any anti-friction bearing must be of the self-aligning type because the bearing parts and surfaces are "hard." "Soft" bearings, such as those of bab-bitt, generally are of the rigid type.



IN this article, the second on the subject, Mr. Kice discusses briefly the factors influencing the thickness of plate used in fans that handle high-temperature and corrosive gases and abrasive material. Shaft and bearing requirements are also outlined. The first article appeared in THE IRON AGE of March 30, page 507.



Once lined up during the original installation, they remain aligned, any slight misalignment being taken up in "running in" the bearing.

The illustrations show fans made of 18-8 rustless steel. The Sirocco wheel tie rods, normally upset and forged, terminate in cast pads made either of the 18-8 alloy or of Nichrome. These castings are riveted to the outside rim and the 18-8 rods threaded into the castings. The reinforcing ring is used to prevent the blades from "wilting," as this fan is made for operation at about 1200 deg. F. The hub is cast of the same material as the terminal pads. All other parts are 18-8 alloy, including the key and shaft.

This housing is welded, though it also could be riveted provided any mild steel structural parts are properly isolated. Rustless steel can be

welded readily. Generally arc welding is easily accomplished with an 18-8 alloy coated rod of about the same thickness as the metal to be welded, provided the polarity of the work is reversed. The part to be welded is made the negative terminal of the electric circuit from the welding generator. THE IRON AGE of Dec. 31, 1931, page 1689, contained good instructions for the electric arc or gas welding of rustless steel.

E. T. Weir Sees Growing Volume of Business

E. T. Weir, chairman, National Steel Corp., in a statement given to *Forbes Magazine*, reports greater confidence in steel prices and "a reduced but growing volume of business" since the bank holiday.

"We have observed an improving business trend, with a small and gradual increase in incoming specifications since the resumption of partial banking facilities over the country," said Mr. Weir. "The volume is still, however, considerably under that preceding the bank holiday. Our sales force reports a much improved sentiment on the part of buyers and more confidence in price stability."

In a statement to the *Pittsburgh Post-Gazette*, Mr. Weir said that salary cuts recently announced by the United States Steel Corporation, which have spread to some other steel companies, will not apply to National Steel employees. "My recent statement opposing wage cuts in the steel industry," said Mr. Weir, "represented the unanimous opinion of those with whom I am associated in this company and was intended to apply to salaried employees as well as wage-earners. We have not in any way changed the opinion which it expressed."

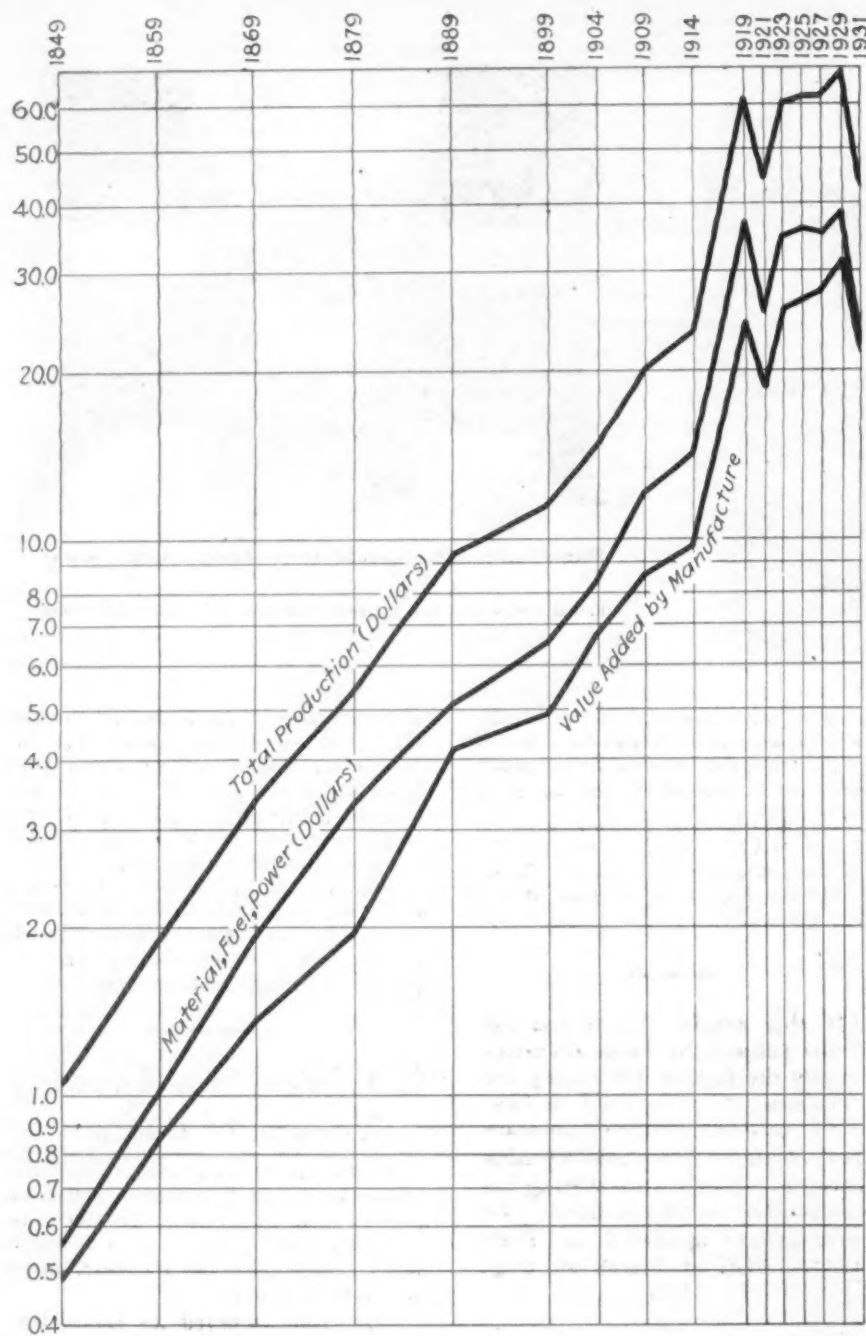


Chart 29—The Growth of the Dollar Volume of Production

TABLE GIVING DATA FROM WHICH CHARTS 29 AND 30 ARE DRAWN

Year	Millions of Dollars			Relatives	
	Total Production	Materials Fuel Purchased Energy	Value Added by Manufacture	Production W. P. I. I.e. Physical Volume	Value Added W. P. I. I.e. Phys. Vol. Equiv.
1849	1,019	555	464	1,696	772
1859	1,886	1,032	854	3,092	1,400
1869	3,386	1,991	1,395	3,600	1,493
1879	5,370	3,397	1,973	9,100	3,357
1889	9,372	5,162	4,210	16,450	7,335
1899	11,407	6,576	4,831	21,850	9,250
1904	14,794	8,500	6,294	24,800	10,545
1909	20,672	12,143	8,529	30,600	12,620
1914	23,988	14,278	9,710	35,250	14,260
1919	62,042	37,233	24,809	44,700	17,900
1921	43,653	25,321	18,332	44,720	18,780
1923	60,556	34,076	25,850	60,100	25,690
1925	62,714	35,936	26,778	60,550	25,860
1927	62,718	35,133	27,585	65,750	28,900
1929	70,420	38,520	31,900	73,000	33,050
1931	41,333	21,420	19,913	56,650	27,290

Source—"Statistical Abstract," 1932, p. 730.
W. P. I.—Wholesale Price Index.

What the M

By WALTER S. GIELE

THE output of industry has two aspects—money value and physical volume. Each of these in turn may be considered as an aggregate total or with respect to the relative average productivity of the individual wage earner and with respect to the relative average productivity per horsepower.

Money value of output or physical value of output in any appropriate unit may be divided into two parts—the value or quantity of raw material, of fuel for power or purchased power and the value added by manufacture or quantity of manufactured units produced.

The distinction between these two parts is important because the product of one industry often is the raw material for another. Thus aggregate value output of all industries involves much duplication since the same items may be included more than once as they pass from one industry to another industry. Value added by manufacture, however, eliminates, at each step, the value taken into the process as raw material and measures, therefore, the fabrication only.

"Statistics of value of output are unsatisfactory as a measure of changes in production over a long period," says "Commerce Yearbook," 1926, pp. 13-24, "because of the marked variation in the buying power of money. A rough approximation of the true movement, however, may be gained by comparing value statistics with the general wholesale commodity price index."

In considering measures of production in terms of physical volume it is important to bear in mind that there is involved an aggregate of countless millions of different kinds of things for which there is no single composite unit like gallons of automobiles. "Highly elaborate commodities, in many instances, can not be reported at all in terms of quantity and in many other cases the quantities are not comparable from census to census on account of differences in quality, style, shape and size. The quantitative increase in articles not themselves comparable quantitatively cannot be satisfactorily estimated by adjusting the statistics of value by price indexes. A large proportion of them are newly developed articles in the production of which improve-

the Machine Has Done to Us

▲ ▲ ▲

IN this, the seventh article in the author's factual study of the results of mechanization, he deals with physical volume and productivity as recorded over the long term period.

Two methods of approach are utilized in arriving at the underlying trends; total values and physical volume being the media. Present indications, according to the author, indicate that horsepower per unit of physical volume has passed its maximum.

▼ ▼ ▼

ments take place with exceptional rapidity, while the exceptional increase in output likewise tends to reduce the cost of production. Thus, for illustration, numerical quantities of automobiles produced in 1909 would include all grades of quality from the least expensive to the most expensive and in no grade would be precisely comparable to numerical quantities of automobiles produced in 1929. A comparison of the numerical quantities of the early crystal sets with the radio sets of today would be another case in point.

Underlying Trends Not Obscured

The extent of change shown by the accompanying charts is, however, of such magnitude that underlying trends could not be obscured by lack of precision in the data. For instance, money value of production in 1929 was approximately seventy times the corresponding value in 1849. Indicated physical volume of production in 1929 was more than forty times the corresponding value in 1849. Wage earners in 1929 were nearly ten times wage earners in 1849 and horsepower in 1929 was nearly twenty-five times horsepower in 1869. It is possible, also, to check volume derived from value by figures obtained directly from quantities in terms of physical volume reported as such.

Dollar Volume of Production

Chart 29 shows the growth in dollar volume of production together with its two components, raw material, power fuel and purchased power on the one hand, and value added by manufacture on the other. The three curves move upward substantially in unison, value added by manufacture being uniformly somewhat less than half the total value of product.

Physical Volume and Productivity

While no attempt has been made to develop a trend line, the general characteristics of the chart suggest an "S" form curve of growth from the turn of the century, preceded by the latter portion of an earlier growth of similar characteristics. It might be concluded that the end of the 19th century marked an approach toward a saturation point with respect to the desire and ability of the popula-

tion to absorb manufactured goods. With the new century came, it appears, a new and higher plane of living with new desires and an accelerated absorption of goods. This new "S" appears, in turn, to be levelling off. The need for a new stimulus has been suggested by a number of writers.

Chart 30 is derived from Chart 29 (Continued on Page 571)

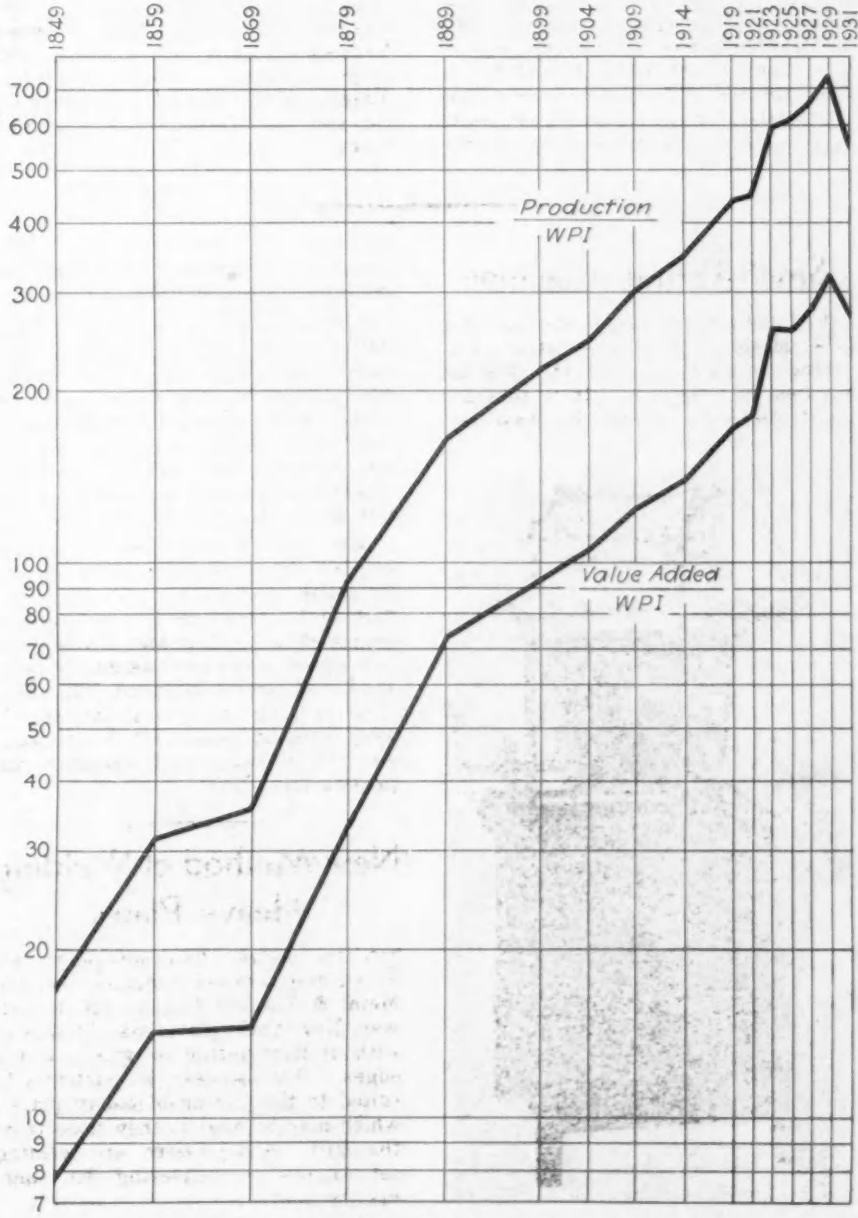
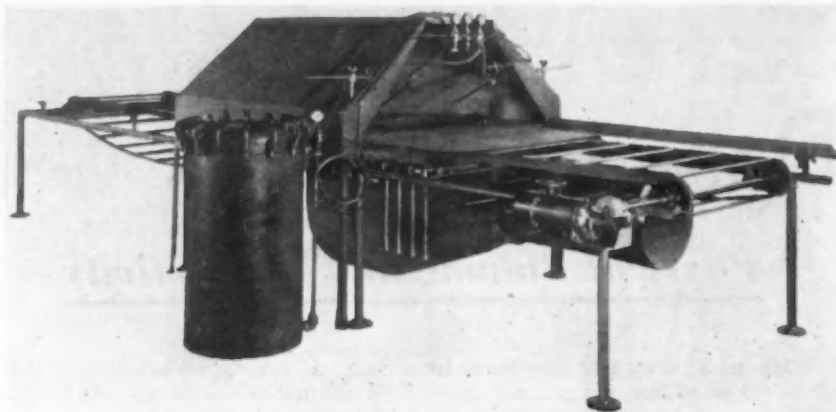


Chart 30—The Growth of the Relative Physical Volume of Production (Derived from Chart 29 by dividing by wholesale price index)



Air-Painting Machine Operates Automatically

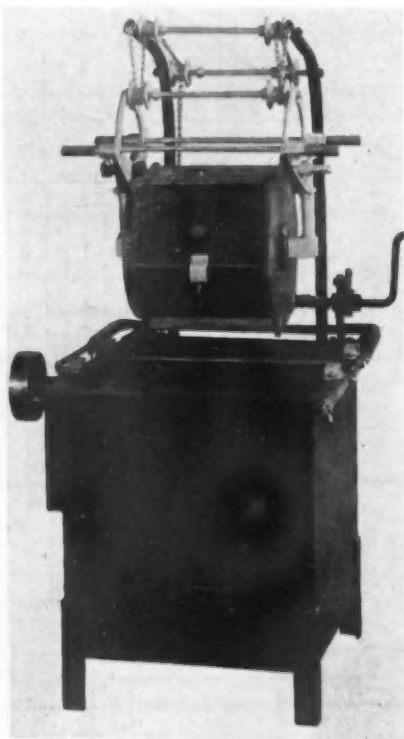
IN applying cold materials, such as paints and lacquers, to metal, wood, paper and other materials, for decorative purposes, the air-painting machine illustrated operates automatically except for loading and unloading. It applies a uniform coat, as light or heavy as desired, and at any lineal speed within the ability of the operator to load the work. The automatic air guns are under accurate control, permitting uniform fan

spray of proper width, and they cut in only as each sheet passes into the coating position. Obviously, this arrangement eliminates waste of material.

The machine is made by the Paascke Airbrush Co., 1909 Diversey Parkway, Chicago, which also builds large and small machines of similar design, with or without drying units, for applying hot and cold liquids to sheets, roll stock or shapes.

Small Plating Machine

A NEW model, designated as the Maximus Junior plating machine, is marketed by the Udylyte Process Co., Detroit. It is intended particularly for plants that have fre-



The plating machine has a 21 x 28-in. tank 22 in. deep and weighs 180 lb.

quent small rush jobs, or insufficient work for the larger plating machines.

The machine is a complete plating unit in itself. The tank is of welded heavy steel construction. The removable cylinder, holding the parts to be plated, is of perforated Formica. A hand hoist and drain board for raising the cylinder and conveniently emptying the load without slop or loss of solution are provided.

The unit is furnished in either belt or direct electric motor drive, the latter giving the advantage of placing the machine in any position regardless of belting and shafting. It is supplied completely assembled with anode rods and connections. The tank is 28 in. long, 21 in. wide and 22 in. deep. The cylinder is 12 in. in diameter, 12 in. long. The weight is approximately 180 lb.

New Method of Welding Heavy Plates

IN the Murex "straight gap" arc welding process announced by the Metal & Thermit Corp., 120 Broadway, New York, plates may be welded without first veeing or grooving the edges. The process is particularly suited to the joining of heavy plates, which may be used as they come from the mill. Any modern arc welding set capable of delivering 300 amp. may be used.

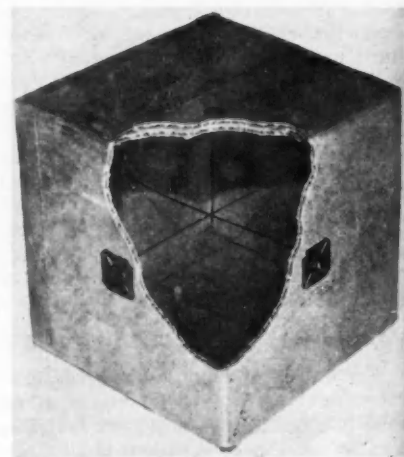
Greater welding speed and appreciable lowering of cost are claimed, the

latter being obtained by eliminating all preparatory work and reducing the quantity of weld metal required. Welding time is said to be reduced by half. It is further stated that tests in outside laboratories indicate that "straight gap" welds are physically superior in many ways.

The company also announces the addition to its line of heavy mineral coated electrodes, a new electrode known as the Murex Universal. This is for use on mild steel and may be employed in either flat, vertical or overhead work. Smooth, clean deposits having high tensile strength and ductility are obtained. Either the Murex Cresta or the new Universal electrode may be employed in the "straight gap" process.

Wire-Stayed Fiber Boxes for Steel Products

DESIGNED for carrying nails, brads, bottle caps and other metal products, the wire-stayed container illustrated is said by its makers, the Nelson Corp., Standard Oil Building,



Baltimore, not to bulge under pressure from a shifting load or when stacked. Each of the side walls is held constantly in perpendicular plane by wire stays which extend from the center of one wall to the center of the opposite wall and are secured by thin metal plates on the outside, as shown.

The box itself is of the regular slotted type, made either of corrugated or solid fiberboard. It is delivered to the user knocked down, with the wire in place. If partitions are used, these also come in place. The compartments permit shipment of assorted sizes of nails, brads, etc. Patents covering this type of box are pending.

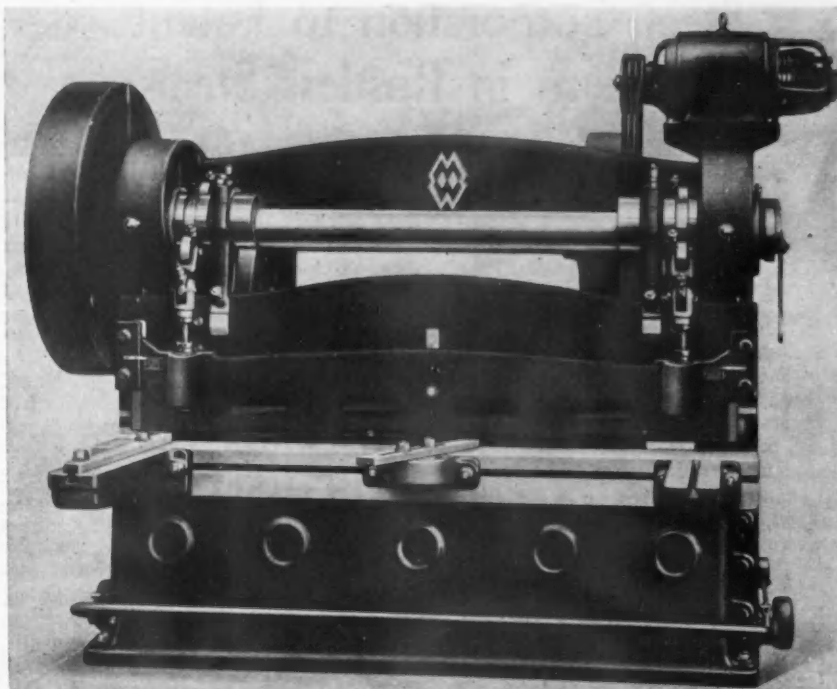
H. A. Brassert & Co., Chicago, have contracted with the Globe Oil & Refining Co. to build a battery of Knowles coke ovens for its Lemont, Ill., refinery.

Squaring Shear With Slide Arranged to Return at Any Point of Stroke

A COMPENSATING drive that permits instant stopping and return of the slide at any point of its stroke, without completing the cycle, is an outstanding feature of the new line of squaring shears being announced by the Schatz Mfg. Co., Poughkeepsie, N. Y. With this drive a plate can be cut into as far as desired instead of having to make the complete cut, and thus a considerable saving made in preparing many types of developed blanks.

A multiple-friction disk clutch with brake is provided. There is a beveling attachment for cutting "Y" or "V" welding edges, and also a side shear. The latter comprises cross-cut blades located at right angles to the long shear blades, and when trimming a narrow strip from a long plate it serves to snip off the trimmings at the end of each stroke, thus facilitating further feeding. The upper blade is attached to the slide and the lower blade is held in a swing-away holder.

An automatic plate hold-down that is self-regulating according to the



thickness of the plate is another feature of the new machines. This hold-down can be swung up out of the way to provide free access when removing the blades, as for grinding. Another type of hold-down provides an illuminated line reflected on the plate which corresponds to the cutting edge. This hold-down incorporates a safety device to prevent injury to the operator's fingers, either from the blades or the hold-down itself.

The shear blades of these machines are considerably longer than the "between housings" dimension, a machine measuring 10 ft. between housings having, for example, a blade length of 11 ft. 8 in. The lower tool,

fixed to an L-shaped tool-steel blade, may be easily adjusted vertically and horizontally to assure uniformly accurate cuts.

Other features include a safety device to prevent accidental tripping or second stroke, and use of high-grade squaring edges front and rear. Heavy machines without the flywheel can be furnished; these employ a direct motor drive which is said to result in substantial savings in power. Shears equipped with friction disk clutch are available in 80 sizes, and smaller machines with steel bolt clutch may be had in 26 sizes. Frame design and construction are said to be such as to assure against spring or breakage.

Power Unit Has Highly Variable Speeds

A VARIABLE-SPEED power unit which may very well be described as built with a ball thrust-bearing, in which, however, the balls are in the form of fixed rollers and the ball races are flat circular disks, has been put on the market by the Merritt Engineering & Sales Co., Inc., Lockport, N. Y. It is known as the Stanley speed variator and is obtainable in sizes for delivering 2 to 20 hp. The disk and roller traction principle used provides for a speed range of three to one with an infinite number of speeds between these limits.

The rollers are in three pairs. These three pairs are arranged radially in a plane perpendicular to the shaft. They are positively driven from the motor, which is located in the upper part of the unit, as shown in the accompanying illustration. The three pairs are held between two disks.

The disks are secured to the output shaft. The rotation of the rollers through their adhesive contact with the disks imparts rotary motion to



Power is delivered from the motor in a wide range of easily adjusted speeds by the Stanley speed variator, which is built in sizes of 2 to 20 hp.

the disks. When the rollers are in their outermost radial position the disks are given their slowest speed, and when the rollers are moved into the innermost position the disks are revolved the most rapidly.

The Merritt company has prepared a little diagram to explain features of construction as well as the principle. For example, by means of a simple spring arrangement the driven disks are pressed against the rollers a predetermined amount to secure the desired tractive result and there is a balancing of the thrust loading, serving to sustain the claim that the variator has only the normal shaft load reactions.

Production of steel barrels in January totaled 292,201 units compared with 300,570 units in December, according to reports received by the Bureau of the Census from 26 establishments.

Steel Corporation to Patent Titanium in Rustless Steels

ANNOUNCEMENT by subsidiary companies of the United States Steel Corp. is made of the development of a method of stabilization of 18-8 (18 per cent chromium, 8 per cent nickel) stainless steels with titanium addition. The corporation says:

"A distinctive contribution to the art of metallurgy is involved in this important development which effectively removes for the first time the hazard of intergranular corrosion, a phenomenon which has heretofore been such a serious factor in installations where heat treatment is impracticable after welding and in cases where these steels are used in applications involving high temperatures."

The process and methods of heat treatment used in the production of USS Stabilized 18-8 are covered by patent applications now pending on behalf of the subsidiary companies of the United States Steel Corp. This product is now available in all stainless steel products manufactured by subsidiary companies of the corporation.

Practice What They Preach

Rendered obsolete by the development of more modern types of automatic screw machines, the machines shown in the picture below have been discarded by the National Acme Co., Cleveland, and are piled in the yard to be broken up for scrap. The pile is composed entirely of automatic screw machines, several hundred in number. The decision of the company to remove the manufacture of its automatic screw machines from Windsor, Vt., to its Cleveland plant, where it is centralizing its manufacturing activities, led to the thorough renovation of all of its manufacturing facilities. Although the machines are still in operating condition, they will be replaced by modern machinery. Referring to

the scrapping of these machines, F. H. Chapin, president of National Acme Co., stated: "We consider it a hopeless attempt to meet modern competition with obsolete machine tools even though they may be in good condition. We not only recommend rehabilitation to our customers—we believe in taking our own medicine."

C. Newman Wire Co. and J. D. Crosby Co. Combine

The C. Newman Wire Co., Inc., 25 Church Street, New York, and its manufacturing affiliate, the J. D. Crosby Co., whose cold-rolled strip mills are at Pawtucket, R. I., have consolidated their interests and formed a new company to be known as the Newman-Crosby Steel Corp. The company states that the sole reason for the consolidation is to effect economies through the elimination of certain activities that are now duplicated. The accounting department will be moved to Pawtucket, but no changes in personnel of the merged companies are contemplated.

Officers of the new corporation are Gordon Gordon, chairman of the board, Charles Newman, president, M. A. Harris, vice-president in charge of sales, and Robert G. Ashman, vice-president in charge of production.

Breweries to Make Large Motor Vehicle Purchases

WASHINGTON, April 4.—Purchase will be made in the near future by numerous breweries of 4590 trucks and 4960 passenger automobiles, while \$20,000,000 will be spent annually for maintenance of this equipment, according to the Automotive Division, Department of Commerce. Some breweries are reported to be over-

hauling motor vehicles at a total cost of approximately \$6,000,000.

The estimate of brewery purchases is part of a general survey made by various divisions of the department.

The Electrical Equipment Division reports that manufacturers of refrigerators are spending money and adding men to their payrolls in anticipation of increased sales. One company, it is stated, has spent approximately \$1,000,000 for new equipment within the past few weeks and \$2,500,000 for materials to be used in the manufacture of refrigerators.

New designs for refrigerators are reported coming into the market and additional new models are in prospect. One manufacturer is producing a small "beer cooler" to be installed in hotel rooms. Others are reported to be making changes in existing models so that one compartment may accommodate beer bottles.

It is stated also that sales of beer pumps and other devices to be used in the retail sale of beer are under way.

Fabricated Steel Plate Orders Up in February

WASHINGTON, April 4.—February orders for fabricated steel plate rose to 16,588 tons from 11,128 tons in January, reports by 48 manufacturers to the Bureau of the Census show. Of the total, 8347 tons was for oil storage tanks and 7660 tons for miscellaneous purposes.

Legislation Urged Against Depreciated Currencies

WASHINGTON, April 4.—Prompt enactment of legislation to protect American industries and wage-earners against the destructive competition of imports from countries having depreciated currencies was strongly advocated in a report presented last Friday to the board of directors of the Chamber of Commerce of the United States. The report was submitted by the chamber's foreign commerce committee, of which James A. Farrell is chairman.



Has the Dollar Been Over-inflated?

By G. L. LACHER

OUR national wealth at the end of 1932, according to an estimate by the Alexander Hamilton Institute, was smaller than for any year since 1916. The decline, of course, is in terms of dollars, since the physical wealth of the country has increased markedly in the 16-year period. We are poorer not in terms of the world's goods but in terms of the symbols that stand for those goods.

Particularly rapid appreciation of the dollar has occurred during the current depression. Those who confuse the symbol for wealth with wealth itself have called this increase in the value of the dollar necessary and salutary. The difficulty is that the demand for symbols has gotten out of bounds. With the dollar value of wealth sinking, the universal preference is for dollars rather than wealth.

Efforts to stop the stampede for dollars have been made throughout the last three years. Public works were tried as a means of creating a demand for goods as opposed to dollars. The Federal Reserve system, through its open market policy, attempted to entice dollars into trade and investment. The Reconstruction Finance Corporation, by lending to hard-pressed banks and railroads, tried to obviate the necessity for converting securities into dollars. But, to date, opposing forces have been too strong. The drafts on our gold by foreign countries, the hoarding of money by our own citizens, and the failure of a large number of banks to reopen after the banking holiday are notable among influences that have added impetus to deflation. The inevitable result has been further reduction of production and new recruits for the already crowded ranks of the unemployed.

Decline in Income, Increase in Tax Burden

Diminished wealth production has meant smaller income. Idle dollars and idle workmen earn nothing. The magnitude of the shrinkage is indicated by the fact that our national income in 1932 was only 44 per cent of what it had been in 1929. As income has dried up the proportion of it going into taxes has risen. Last year 40 per cent of our income was absorbed by Federal, State and local governments as against only 15 per cent in 1929.

This heavy tax burden represents a condition and not a theory. It is a load that is obviously too heavy for business to bear. Hence the action of Washington in drastically cutting Federal expenditures has been gener-

ally applauded. However, balancing the budget on paper is not balancing it in fact. Outlays can be reduced, but income cannot be accurately forecast. If the price and production trends continue downward, tax revenues will fall below present estimates. The Government can do all of the things said to be needed to restore confidence, but the real impetus for an increase of national income must come from business itself.

Maladjustments That Are Replaced by Maladjustments

Orthodox economists contend that all that is required to start the wheels of industry moving is to wipe out maladjustments in wages and prices. They have applauded all reductions in prices and wages as essential steps in this leveling process. But they have overlooked or minimized the fact that their formula merely exchanges one set of maladjustments for another which is equally serious. Fixed charges of all kinds, whether in the form of railroad or industrial bonds, farm mortgages, or encumbrances on workmen's cottages, have, in increasing number, grown so burdensome as to become unbearable. Bitter-end deflationists, in their zeal to achieve the blessed state of economic balance, recommend bankruptcy for business organizations and foreclosure for farmers and workmen as the only logical course. And it must be admitted that events, so far, have drawn us in that direction.

The final consequences of such a drastic readjustment would be hard to forecast. Aside from the injustice and inhumanity to those who are deprived of their hard-earned equities, there is the danger of inflicting grave injury on countless others who are not directly concerned. It need only be mentioned that insurance companies and saving banks have a large stake in bonds and mortgages, and their assets cannot be impaired without serious loss to policyholders and depositors.

"Sauce for the Goose"

But even the logic of the ultra deflationists usually breaks down at this point. "Of course," the refrain goes, "we must defend the position of insurance companies and banks. They represent the very foundation of our economic structure." But if an exception is to be made for institutions, justice demands that the same excep-

tion be made for businesses and individuals. Deflation cannot be good for one and bad for another.

If economic balance must be restored at all costs, let the deflation be uniform. Let creditors as well as debtors bear their share of the burden. This principle has been recognized in the new bankruptcy act recently passed by Congress. It is recognized in the Government bond issue proposed by the Administration as a means of refinancing farm mortgages at a lower rate of interest.

These agricultural bonds may be opposed on the ground that they tend to nullify the Government's economy program, piling up new obligations to take the place of those which have been eliminated. But such a view is narrow. After all the Government is merely taking over a private service that has temporarily failed because of the deflation. By distributing the risk and throwing the weight of its own credit behind it, Washington will draw capital into channels that it would otherwise avoid. Private investors, it is believed, will buy these blanket bonds, whereas they would be reluctant to renew or purchase mortgages on individual properties. The Government, under this plan, is really setting itself up as an intermediary between private lenders and borrowers of capital.

Naturally the bond issue will not cure the farmers' difficulties aside from reducing their fixed burdens and enabling them to hold on to their equities. A rise in demand for agricultural products will depend on other factors. Whether those forces will issue from the farm relief bill or from undisclosed sources it is impossible to prophesy. The complexities of our economic life and its sensitiveness to so many outside influences, among which world political developments now loom large, present a baffling problem even to the high priests of the "dismal science." Certain it is, however, that catchwords like "economic balance," "deflation," "inflation," "reflation," "confidence" and what have you are not likely to lead us to the light.

Will the Boom in the Dollar Burst?

The steps taken by the Government to cope with the depression have been defensive in character. This is true of the emission of emergency currency and the proposed refinancing of farm mortgages, both of them measures calculated to halt liquidation. It is hoped that surcease from forced conversion of property into dollars will

permit business enterprise to get a new foothold. But such hopes are colored by pronounced skepticism. Owing to repeated disappointments public sentiment has become resigned to continuing depression just as it believed in continuing prosperity during the late 20's. This depression, we are told, is like all other post-war slumps and it is folly to look for anything more than a slow and painful climb out of the trough.

But we may be wrong again. Looking at the picture from the restricted view of the metal-working industry, there are nascent developments that may contribute to a sudden turnabout face. Although industry is generally believed to be suffering from a great excess of producing capacity, those who are close to manufacturing are aware that something has happened to that excess. For many months idle equipment has been robbed to repair operating equipment and it is now a serious question how much of industry's surplus capacity is actually ready to run. It may be significant that March repair part orders of a leading maker of stokers and boilers were the largest for any month of the depression. And that, in some instances, equipment makers are now receiving telegraph orders for parts with the instructions that they be shipped by express or airplane.

A Potential Stampede for Replacement Parts?

It would take only a small upturn in business, according to some observers, to create a veritable stampede for replacement parts to rehabilitate crippled machinery and equipment. Whether the force of such a demand would be enough to set in motion a broad swing toward recovery is naturally unpredictable. Nevertheless, the longer industrial repairs are postponed, the stronger the rebound of demand will be when necessary expenditures are resumed.

This is just one way in which the quest for dollars may suddenly be transformed into a quest for goods. A long diet on the mere symbols of wealth will inevitably create an enormous appetite for wealth itself.

Steel Barrel Orders Rose in February

WASHINGTON, April 4.—Production of steel barrels in February declined to 269,755 units from 292,201 in January, according to reports received by the Bureau of the Census from 26 establishments. Orders made a sharp increase in February, rising to a total of 453,083 barrels at the end of the month compared with 275,354 at the end of January. Orders for delivery within 30 days from the end of February totaled 228,767 compared with 75,767 at the end of January, while orders for delivery beyond 30 days were 224,316 and 199,567 barrels respectively.

Malleable Iron Industry Discusses Various Problems

TECHNICAL and other problems of the malleable iron industry were discussed at the quarterly meeting of the Malleable Iron Research Institute held at the Hotel Cleveland, Cleveland, March 29, during which an interesting and instructive program was carried out. Activities of the institute in securing wider application for malleable iron for products in the use of which there is an economic or engineering advantage were reported by the president, E. E. Griest, Chicago Railway Equipment Co., Chicago. Bulletins showing new uses for malleable castings are now being sent to members, and all members are urged to cooperate in this activity by supplying information relating to conversion to malleable castings of work heretofore made of other materials.

Redesigning and restyling castings should be given more attention, declared Enrique Touceda, consulting engineer of the institute, who referred to the trend in the demand toward more graceful lines in products, mentioning that lightness is not the only important factor. People are willing to pay a good price for decorative effects, he said. Prof. Touceda reported on a questionnaire that had been sent out relating to the variation in carbon content at different intervals in pouring and discussed briefly a new process for nitriding malleable iron with the use of which it is claimed a deep case can be secured. A wide range for use will be developed, he believed, if hard or unannealed malleable iron can be nitrided.

To Conduct Research Work

Research work in connection with problems relating to pig iron will be conducted by a research bureau to be established by the Interlake Iron Corp. Mr. Griest announced that the Interlake corporation had offered to establish such a bureau to determine the character of iron most suitable for various types of malleable castings, and an institute committee had been appointed to cooperate in the matter. This research work will be conducted by a man qualified with metallurgical and other experience who will be selected by the Interlake corporation.

Uniform Rate Setting

Definite steps toward the adoption of a uniform rate setting in plants of members was taken in the appointment of a committee to make arrangements with Stevenson, Jordan & Harrison, industrial engineers, Cleveland, for the inauguration of the system. T. M. Harrison of that firm, who explained the proposed rate-setting methods based on time studies of vari-

ous operations at the annual meeting in December, reported on a rate-setting survey he recently made in four foundries of members. A committee was appointed to negotiate for this service.

Results of surveys relating to production and prices of malleable castings were presented by R. E. Belt, secretary of the institute. One chart showed that in the past few years prices paid by the automotive industry for malleable castings had declined \$15 more per ton than the decline in malleable castings to railroads and miscellaneous users. Decrease in the demand for malleable castings had not been greater than the decrease in other commodities during the period of depression, although since 1931 there had been a greater falling off in the demand for malleable castings than for finished steel.

Price Variations Due to Errors in Calculating Weights

Discussing the variations in calculated weights of malleable castings from blue prints and their effect on cost estimates, Mr. Belt showed the wide variety of blue print weights submitted by six large producers on an inquiry for 12 items. This variation was as high as 123 per cent on one item. Much of the price variation he said is due to errors in weight.

A review of the recent decision of the United States Supreme Court in the Appalachian Coals case, involving the legality of group selling of coal, was presented by H. B. Fuller, Cleveland attorney, and caused some thought among members as to whether they could apply the principles of this decision in a beneficial way in their own industry.

The board of directors voted to adopt as a trade custom a rule that patterns may be retained by a foundry until a customer pays his bill and this action was approved.

C. S. Anderson, Belle City Malleable Iron Co., Racine, Wis., was appointed a member of the A.F.A. committee to consider power costs.

Automobile Production Declined in February

WASHINGTON, April 4.—Output of motor vehicles in the United States in February declined to 106,814 units from 130,114 in January. The February output consisted of 91,340 passenger cars, 15,322 trucks and 152 taxicabs. The Canadian output of motor vehicles in February dropped to 3298 from 3358 in January.

OFF THE ASSEMBLY LINE



Sales and Production of Motor Cars Increase; Steel Releases Better

DETROIT, April 3.

THE pessimism so rampant in automotive circles for the last two months has been replaced by a spirit of buoyancy. This change in outlook is attributable to an encouraging pick-up in retail sales in the latter part of March and to increased production schedules for this month. The promise made by the Treasury Department at Washington on Saturday that a further disbursement of 40 per cent would be made within 10 days to the 800,000 depositors in the two closed banks also has had a cheering influence. It means that over \$206,000,000 will be available, much of which represents part of the working capital of thousands of small Michigan companies.

Improvement in retail deliveries of motor cars has been felt by almost all manufacturers. Chevrolet's record is the most arresting in the entire industry. During the second 10 days of March it delivered to consumers 10,006 new cars and trucks, despite the existence of the national banking holiday through much of the period. In the comparable period last year, sales were 10,378 units. From the first of the year to March 20, retail deliveries amounted to 88,068 units, as against 86,769 in the same period of 1932. In view of the banking difficulties which extended over the latter half of the period, this showing is little short of phenomenal. The way in which March business held up surprised even Chevrolet's officials. There is an excellent chance that purchases in the last 10 days of the month may have surpassed the 13,504 units in the comparable period of last year.

Breweries to Buy Motor Vehicles

DeSoto's sales during the week of March 18 were 75 per cent above those of the previous week, while Dodge reported an increase of almost 50 per cent. Pontiac's retail deliveries in the second 10 days of March were 70 per cent greater than in the first 10 days, and dealers now are ordering cars at the rate of 250 a day. The Hudson company declares that its re-

tail sales have taken an upward turn. Sales departments of all companies are busily engaged in trying to secure their share of the lucrative business which the brewing industry soon will place. This business will consist of heavy trucks, light delivery trucks and passenger cars for salesmen. The United States Department of Commerce estimates that beer makers will buy 4590 trucks and 4960 passenger cars, but it is believed here that these figures are too low. Expenditures for maintenance of vehicles are expected to be about \$20,000,000 annually.

Chevrolet's operations are gaining ground faster than anticipated. Assemblies late in March are reported to have raised the month's output above the 30,000 mark. The minimum production quota for April is 40,000 cars, but indications are that the total may be 50,000 or better. Chevrolet in the past week has given steel releases in considerable volume, both for its local and its Flint plants. The releases include some steel already rolled and awaiting shipment at the mills, as well as fresh purchases. Chevrolet's Detroit plants are planning to work four days a week during April. Because of the difficulty in getting cars to dealers while the bank holiday was on, stocks of new cars in the field declined 3477 units in the second 10 days of March, contrary to the usual seasonal trend.

Ford Program Expanding

Ford is proceeding with its program of making 40,000 of its large V-eight cars in April, with 60,000 tentatively scheduled for May. Small steel releases have been coming through from day to day. The steel trade is anticipating steel orders from Ford in increased volume in the immediate future, with requests for rush deliveries. This will mean a hectic period during which Dearborn officials will pound at the doors of the mills demanding fulfillment of requests which some steel people believe cannot be met because of small mill stocks. Briggs and Murray are reported to be running five to six days

a week on Ford bodies. A story has been circulated to the effect that Murray no longer has a frame contract with the Ford company. It is understood that this is not true, despite the fact that most of Ford's present frames are being built at the Rouge plant. For months the Murray plant at Ecorse made practically all of Ford's passenger car frames as well as half of the truck frames. It seems to be Ford's practice to divide its frame business between Murray and its own frame department at Dearborn.

The various Chrysler divisions are said to have an April schedule of at least 16,000 cars. Plymouth and Dodge, as usual, will be in the vanguard from the standpoint of volume. Chrysler has given some steel releases the past week and now is in the process of awarding second quarter steel contracts. It is believed that, like Chevrolet, Chrysler will make no change in its sources of supply.

Willys-Overland is reported to be manufacturing 75 trucks a day, employing about 1000 men for this purpose. This work has been made possible by an advance of \$1,000,000 by the International Harvester Co. through the purchase of receivers' certificates. Willys has 500 passenger cars completed at its plant and 1592 cars which were 90 per cent finished when work was suspended. It is estimated that work can be completed on the unfinished cars at a cost of \$108,000. Former Willys employees are suing to compel the receiver to sell assets to satisfy wage claims of \$316,000.

April Output of 125,000 Cars Forecast

Expecting to work two days the past week, Pontiac actually operated four days. Its program is expanding steadily. Buick is turning out cars at a rate of about 2500 units a month. Factory operations throughout the industry were so irregular during the banking holiday that the total output in March is anyone's guess. It is safe to say, however, that it did not fall

to the low level some observers believe. April production will range upward of 100,000 units, with the three leading interests building almost that number. There is no inclination on the part of any company to make cars except on a hand-to-mouth basis; nevertheless it is reasonable to expect a production this month of at least 125,000 cars. A still larger output is forecast for May. Events seem to be moving toward further concentration of business in the hands of General Motors, Ford and Chrysler.

Detroit Notes

The latest count of Michigan banks shows 210 open and 172 in the hands of conservators. With the State's in-

dustries crippled by such a breakdown of banking, it will be a long time before business gets back to normal. . . . Chrysler deposited \$4,000,000 and Ford \$1,000,000 in the new General Motors-sponsored National Bank of Detroit. Henry and Edsel Ford have waived claim for a period of years to \$1,000,000 in the Dearborn State Bank, enabling the bank to pay other depositors 100 per cent. . . . General Motors has written down its plants and equipment from a fairly conservative \$115,491,946 to \$22,779,411, a figure which is estimated to be the salvage value. This will enable the corporation to cut its depreciation charges about \$7,000,000 a year.

was in the Army two years, serving with the First Liberty Motor Squadron. In 1919 he started as a salesman at Chicago for the Wire company and was later transferred to Cleveland and then to Detroit. In 1924 he was made assistant manager of sales at Detroit and in 1928 he was transferred to Chicago as assistant to the vice-president. Mr. Maguire has been golf champion for three successive years at the Flossmore Country Club, Chicago.

L. S. HAMAKER, manager of the sales promotion division of the Republic Steel Corp., addressed the industrial division of the Cleveland Advertising Club, March 31, his subject being "Advertising Puts On Overalls."

M. W. FLOTO, formerly of the Detroit office, has been named assistant to the vice-president and general manager of sales, with headquarters at Chicago, for the American Steel & Wire Co., succeeding H. B. MAGUIRE, who has been made manager of sales at Detroit. R. P. MACDUFF has been made assistant manager of sales at Detroit, and H. D. WORTHINGTON has been named assistant manager of sales at Pittsburgh. W. A. LA PIERRE is the new assistant manager of sales at Kansas City and T. HASKELL is now manager of sales at Salt Lake City, Utah.

RAYMOND F. GARCIA has been appointed general manager of sales of the Universal Pipe Division of the Central Foundry Co., New York, succeeding LEONARD W. SAIN, who has resigned to go into business for himself in the manufacture of soap and sanitary products, Orlando, Fla. Mr. Garcia will make his headquarters at the general offices of the Central Foundry Co. in New York.

At an organization meeting of the board of directors of the Superior Steel Corp., Pittsburgh, on March 28, the following officers were elected: FRANK R. FROST, president; J. E. WETZEL, vice-president; P. C. JENNINGS, treasurer; C. D. CLANEY, secretary and assistant treasurer, and DONALD M. LIDDELL, assistant secretary. MR. WETZEL, the new vice-president of the corporation, has been general manager of sales since 1930, and will continue in active charge of that department. He joined the Superior organization in 1915, and was for many years assistant manager of sales in the Eastern territory, with offices at Philadelphia.

L. WOODWARD FRANZHEIM, formerly assistant secretary of the Wheeling Steel Corp., Wheeling, W. Va., has been elected treasurer of that company, succeeding W. H. MANNING, who has been assigned to special executive duties. Mr. Manning has been with the Wheeling corporation and its predecessors for

PERSONALS

JAMES LIPPINCOTT, whose election as chairman of the board of the West Leechburg Steel Co. was announced in THE IRON AGE last week, has long been prominently identified with the steel industry. He began his career in May, 1885, with Carnegie Brothers & Co., Ltd., Pittsburgh, continuing that association until October, 1888. At that time he became identified with Kirkpatrick & Co., Ltd., Leechburg, Pa., which was affiliated with the Chartiers Iron & Steel Co., Carnegie, Pa., and engaged in the manufacture of sheet steel. The business of these companies was sold to the American Sheet Steel Co. in 1900, and Mr. Lippincott served for six years in the operating and sales departments of that organization. At that time he took up the duties of general manager of the West Leechburg Steel Co., a company which he and his associates had organized in 1897. Subsequently he has served as secretary, vice-president and president of that company, which is engaged in the manufacture of hot and cold-rolled strip steel. Mr. Lippincott was an early member of the American Iron and Steel Institute, and is widely known throughout the industry.

THOMAS AURELIUS, who in recent years has been head of the railroad sales department of the Colorado Fuel & Iron Co., Denver, Colo., has been elected a vice-president of the company. Mr. Aurelius has been with the Colorado company for 31 years, having started as a clerk in the wire department. After his transfer to the sales department in 1907, he spent some time in the El Paso, Tex., and Los Angeles, Cal., offices. In 1910 he was made superintendent of the wire mill at Pueblo, where he remained until 1917, when he went to the company's main office in Denver as assistant to J. Chilberg, who was then vice-president and general manager of sales. Mr. Aurelius in his new position will continue to supervise sales to the railroads.

H. B. MAGUIRE, who since 1928 has been assistant to the vice-president and general manager of sales of the American Steel & Wire Co., has been made manager of sales at Detroit. Mr. Maguire was graduated in 1917 from Armour Institute and for four years operated stations for the Commonwealth Edison Co., Chicago. He



J. LIPPINCOTT



T. AURELIUS



H. B. MAGUIRE

OBITUARY

more than 40 years. ROBERT E. WASSER, formerly manager of the payroll department of the Wheeling corporation, has been named assistant secretary, succeeding Mr. Franzheim. Other officers have been re-elected.

GEORGE L. COLLORD, vice-president of the Shenango Furnace Co., Pittsburgh, has been elected a director of the Sharon Steel Hoop Co., Sharon, Pa.

THOMAS J. JAMISON, superintendent of the No. 3 open-hearth mill at the Homestead, Pa., works of the Carnegie Steel Co., has retired after having been identified with that plant since 1879. He had held his recent position since 1915, and was one of the oldest men in the company in point of service. Upon retirement he was presented with a bronze statue by R. H. WATSON, vice-president of the Carnegie company, on behalf of his fellow superintendents.

ROY C. MUIR, for the past three years assistant to the late Charles E. Eveleth, vice-president in charge of engineering, has been appointed manager of the engineering department of the General Electric Co. In his new capacity, Mr. Muir will have direct charge of the company's designing engineering in all of its various plants, works laboratories, and the general engineering laboratory at Schenectady. He has been identified with the General Electric Co. for the past 28 years, having entered the student engineering course at Schenectady upon his graduation from the University of Wisconsin in 1905.

WILLIAM MCFATE, who has been connected with the sales department of the Wheeling Steel Corp. as assistant in charge of tin plate sales, has resigned to become associated with the sales department of the Youngstown Sheet & Tube Co., at Youngstown. Mr. McFate was formerly with the Trumbull Steel Co.

JOSEPH DILWORTH has been appointed assistant to F. A. MERRICK, president of the Westinghouse Electric & Mfg. Co., East Pittsburgh. He has been secretary and assistant treasurer of the Dilworth-Porter Co., Inc., and also secretary of the Witherow Steel Co. Most recently Mr. Dilworth served as managing director of the National Program for Replacement of Obsolete Equipment in Manufacturing plants.

WILLIAM W. COLEMAN, president, Bucyrus-Erie Co., South Milwaukee, Wis., has been elected chairman of the board of directors of the Milwaukee County Community Fund. He is a former president of the Fund and has been a director since its foundation.

ANDREW CAMERON PEARSON, chairman of the United Publishers Corporation, which publishes THE IRON AGE, died suddenly from a heart attack at his home at Monclair, N. J., on March 31 at the age of 59. Mr. Pearson was born at Coffeyville, Kan., on Nov. 17, 1873, and received his advance schooling at Baker University, from which he was graduated in 1895, and at Northwestern University, from which he received a degree in 1896. He started in business as an insurance claim adjuster;



A. C. PEARSON

later became manager of the Pearson Brothers' department store at Osawatimie, Kan., where he received a training in merchandising that developed an interest in the trade publishing field. In 1898 he joined the advertising staff of the *Dry Goods Reporter*, of Chicago, from which *Goods Economist*, of New York, in 1904. In 1913 he was made secretary of the United Publishers Corporation, which owns THE IRON AGE as well as a number of other business publications. He had been chairman of the United Publishers Corporation since 1926, having previously served as treasurer and vice-president, as well as secretary. Mr. Pearson was president of the National Publishers' Association, national chairman of the American Publishers' Conference, director of the Merchants' Association of New York, and was a director of the Chamber of Commerce of the United States from 1922 to 1924. In 1931, Mr. Pearson was made a Chevalier of the Legion of Honor for services to the French Government.

JESSE WAGER WALKER, chairman of the board of the Pittsburgh Construction Co., and a pioneer in the development of steel construction, died on April 1 at his home near Valley Forge, Pa. Mr. Walker was

also board chairman of the Duquesne Slag Products Co., and prominently identified with the Concrete Products Co. of America. He was graduated from the Polytechnic College of Pennsylvania at Philadelphia in 1863, and was employed for a time in the engineering department of the Pennsylvania Railroad in the Pittsburgh division, of which Andrew Carnegie was then superintendent. In 1869 he became resident engineer for the Keystone Bridge Co., and after several years in this capacity founded the Shiffler Bridge works, of which he became president following its incorporation as the Shiffler Bridge Co. in 1890. When the Shiffler organization was taken over by the American Bridge Co. in 1900, Mr. Walker remained as general manager of sales in the Pittsburgh district. One year later he organized the Pittsburgh Construction Co. and served as its first president.

DR. WILLIAM CAWTHORNE UNWIN, engineer and educator, known throughout the English-speaking world, died March 17. He was in his ninety-fifth year, having been born Dec. 12, 1838, at Coggeshall, Essex, England. He is remembered among Americans especially for his "Elements of Machine Design," which was originally produced in 1877 but, through many editions, remained long a classic in mechanical engineering literature. The numerous honors which came to him included the presidency of the Institution of Civil Engineers, in 1911, and that of the Institution of Mechanical Engineers in 1915. In 1898 he was made honorary member of the American Society of Mechanical Engineers. In 1890 he was a member, along with Lord Kelvin, Prof. Coleman Sellers of Philadelphia, and Prof. E. Mascart, of Paris, of the International Niagara Commission, which studied the proposal to build the first Niagara Falls hydroelectric plant and which blazed a trail in the electric transmission of power. The most important of his teaching connections was that with the Central Technical College, of London, of which he became the first professor of engineering in 1884 and which, on his retirement in 1904, he left as his great monument to engineering education.

FREDERICK W. PARSONS, vice-president of the Ingersoll-Rand Co., New York, died after a long illness at his home in Corning, N. Y., on April 1, aged 67 years. He was manager of the Ingersoll-Rand plants at Painted Post, N. Y., and Athens, Pa., and was formerly manager of plants of the company at Ossining and Tarrytown, N. Y. Mr. Parsons was credited with the introduction of several changes in air compressor manufacture.

... LETTERS TO THE EDITOR ...

Recovery Will Not Come From Abroad

Editor, *The Iron Age*:

I have read with great interest in the *New York Herald*, of Paris, extracts from your article on "Bankocracy" (*THE IRON AGE*, Jan. 19) and I wish to congratulate you on your sound and courageous attitude. Your article is the first common-sense utterance that has come out of the United States since the beginning of the depression. I only hope you will not stop here, but that your article will be merely the first of a campaign to defend the cause of business men and manufacturers and to show the people of the United States where they stand.

We have heard so much drivel from politicians, bankers, professors and economists, all superficial and contradictory, that a feeling of hopelessness has settled upon us. If a generation was ever cursed with vanity, shallow brains and lack of the rudimentary elements of thought, the present is that generation. To those of us who are abroad and who know the America of the past it is a never-ending source of amazement to us that a people that has had a greater influence in the world than any previous people should have become so enmeshed in the web of demagoguery that it seems helpless to solve the simplest problems.

The politicians, educators and most of the so-called intellectual classes that have fattened on the body of American business and that have lulled the plain man into the thought that he is helpless in the currents of world events should now be left high and dry in the maze they have created and business men like yourselves should tell the people what is the matter with the United States. And not tell them once, but a thousand times, if necessary, until they see clearly that soothing syrups are no cure for economic paralysis.

After 40 years of intimate knowledge of Europe, politically and economically, I can tell you that no panacea for the ills of the United States is coming out of Europe. Your recovery, when it takes place, will have to come from your own efforts in America. You can cancel all the debts that the world owes you, but it will not help you an iota. You will make Europe richer, but yourselves poorer. Some Americans are obsessed with the idea that prosperity must come out of Europe through the settlement of the great world problems of the day. But the great world problems of today will be followed by others, and it will never be possible for the United States to satisfy the claims that will be made on it by countries that envy

the United States its strength and its basic wealth and who would like nothing better than to see it entangled in the intricate and deceitful meshes of world politics. The salvation of the United States will come from within itself and not from abroad, and the quicker the business men and manufacturers see it, the quicker will be the return to a healthy state of trade.

But you cannot expect these lessons to come from the politicians and you cannot expect anyone to do your work for you. For the politicians are listening to the swan songs of European politicians and are looking for glory as "statesmen." They are as far removed from the problems of business as nightingales from the Arctic Circle. Meanwhile, you can be assured that Europe will continue to bewilder you until she gets everything away from you that her deceit and rapacity covet.

C. E. Carpenter.

Paris, France.

Editor, *The Iron Age*:

I NOTICED the clause to be inserted in contracts by one of the large and powerful companies who

evidently do not feel that they are getting their share of present business and are blaming smaller manufacturers of making ruinous prices ("The Dance of Death," p. 363, *THE IRON AGE*, March 2, 1933).

For a number of years the large companies only solicited the business of equally large consumers and they were the logical suppliers to the consumer, as smaller manufacturers could not furnish the large volume of product required. But since the depression started the big manufacturer sent salesmen all over the country to get smaller manufacturers' business.

The smaller consumer was satisfied with his source of supply and did not want to change. Then after the big manufacturer found that he could not get the business he at one time did not care for, he made a concession in price but naturally the smaller consumer advised his regular source of supply of the change in price and he met the lower price, as he did not want to lose any business that he felt he was entitled to.

The smaller consumer also is aware that if good business comes back again, his volume will not be attractive to the big manufacturer who is now to blame for ruinous prices.

E. M.

Gear Makers Arrange Annual Meeting

The annual meeting of the American Gear Manufacturers Association will be held at the Penn-Lincoln Hotel, Wilkesburg (Pittsburgh), Pa., May 4-6. Addresses will include: "Heat Treatment of Transmission Gears," by E. F. Davis, metallurgist, Warner Gear Co., Muncie, Ind.; "Bullard-Dunn Descaling Process as Applied to Cleaning of Heat-Treated Gears," by F. T. Taylor, Bullard Co., Bridgeport, Conn.; "Welded Gears," by Everett Chapman, director of research and engineering, Lukenweld, Inc., Coatesville, Pa.; "Lapping of Gear Teeth," by R. S. Drummond, president National Broach & Machine Co., Detroit; "Combination Motor and Spur Gear Reducer Units," by R. S. Marthens, manager, gear engineering department, Westinghouse Electric & Mfg. Co. B. F. Waterman, engineer, Brown & Sharpe Mfg. Co., Providence, R. I., is chairman of the program committee.

Reports from the 11 or more technical standardization committees of the society have been arranged by A. A. Ross, engineer, General Electric Co., Lynn, Mass., chairman of the general standardization committee. The commercial standards committee, headed by E. S. Sawtelle, manager, Tool Steel Gear & Pinion Co., Cincinnati, has arranged a unique pro-

gram relating to sales and service, a feature of which is to be the presentation of two one-act plays entitled "A Sales Lesson" and "What Was Left Out," respectively. H. H. Kerr, president, Boston Gear Works, Inc., North Quincy, Mass., will preside at the group meetings. The annual dinner will be held on the evening of May 5. E. W. Miller, Fellows Gear Shaper Co., Springfield, Vt., is president, and J. C. McQuiston, First National Bank Building, Wilkesburg, Pa., is secretary of the association.

International Automotive Engineering Congress

The Society of Automotive Engineers will hold an International Automotive Engineering Congress at the Palmer House, Chicago, Aug. 28 to Sept. 4, concurrently with the Century of Progress Exposition, the International Air Meet, the Gordon Bennett Trophy Race and other events of wide interest. Technical sessions, committee meetings, exhibits, demonstrations and social gatherings are included on the program. Dr. H. C. Dickinson, Washington, is president and John A. C. Warner, 29 West Thirty-ninth Street, New York, is general manager of the society. Alex Taub, Detroit, is chairman of the meetings committee of the International Automotive Engineering Congress.

• • EDITORIAL COMMENT • •

Ethics of Financial Trusteeship . . .

AROUSED by recent disclosures of dishonest banking and underwriting, the public mind has quickly received with favor the bill for the protection of buyers of securities which President Roosevelt sent to Congress last week. By contrast, we recall the reception given to an editorial in *THE IRON AGE* before the debacle of 1929, urging that banking promoters and vendors of stocks and bonds be held to a stricter account for the statements of their prospectuses. For the most part the idea was treated in press comment as theoretically good, but not workable in a business world in which the buyer was presumed to know his need to beware.

That *IRON AGE* editorial mentioned particularly the formula printed in small type as a last line on prospectuses, to the effect that while the issuing house believed the quoted statements of company officers to be true they assumed no responsibility for the correctness of these statements. That skillfully worded small-type line, it has been said, won a handsome fee for the lawyer who invented it—a fact that is its own comment on the banking ethics of the days before the new deal.

From time to time we have published in these columns the codes of practice adopted by various associations connected with metal working and other industries. These have shown a steady gain in the ethical standards of American business. But it must be admitted that the standards of money-making through the creation and marketing of stocks and bonds have lagged. What we are now to have, in the passage of what will be known as the Federal securities act, is in President Roosevelt's words, "a return to a clearer understanding of the ancient truth that those who manage banks, corporations and other agencies handling or using other people's money are trustees acting for others."

A Yardstick For Finish . . .

HOW good a finish should a machined part have? The difficulty of definitely answering this question is the cause of unnecessary variation in manufacturing costs. Too good a finish may represent a definite manufacturing waste and too poor a finish may mean serious loss in quality of product. Yet the general question of finish receives comparatively little attention on the part of the average manufacturer.

It is encouraging, therefore, to learn of definite progress by engineering committees which are considering the complicated problem of standardizing finishes. Nearly all types of surfaces are being catalogued and evaluated by some of the groups now at work in this field. Even the smoothness of a casting as it comes from the sand will be graded and specified. At present all surfaces of any one casting are regarded as of equal importance by most foundries. Under a revised system of describing finish requirements the designer might call for an A grade of finish on one side of a rough casting and a C grade on another, and the molder, thus directed, would usually

be able to show a saving as against an all-over A grade job.

Perhaps the most important need for standardization of finish is in the field of grinding and machining. The present lack of agreement on any system of finish designation makes it almost impossible for the designer accurately to indicate on a blue print the desired surface appearance of a machine part. Instead, the question usually is left to the judgment of the machinist and he, in ignorance of the final application, often puts too much time on some surfaces and not enough on others.

Competition in Steel Alloys . . .

AN interesting phase of the alloy steel situation was recently emphasized, Will the copper steels become more and more a factor? While such alloy steels are by no means new and are in use today, the Copper and Brass Research Association is sponsoring through research new uses and new types of such steels. This was announced at the last convention of the iron and steel division of the mining engineers during the presentation of a paper describing the new properties of one per cent copper steels that are bestowed by precipitation hardening.

These facts suggest the competition among alloy steels for a place in industry. Copper, as an alloying material, has joined the unremitting research efforts applied to chromium, nickel, vanadium and molybdenum. This activity is healthy and productive. Through it, either new alloy steels or new combinations of the various alloying elements are discovered, some of which prove to have properties of marked value to industry.

This intensive competition can have but one result, the greater use of alloy steels. It is becoming convincingly evident that the future of this department of the steel industry is very bright. Supporting this is the fact that, during the depression, it is the alloy steel industry, particularly that part of it devoted to the rustless steels, which has made the best comparative showing.

Iron and Steel Exports . . .

THE low depths to which the volume of iron and steel exports have sunk is revealed by a comparative analysis of official statistics. It should be emphasized, however, that a real measure of our exports is obtained by deducting from the totals the amount of scrap iron and scrap steel sent abroad. The result gives the exports of rolled iron and steel, of pig iron and ferroalloys and of castings. On this basis the exports to March 1, this year, have been only 25,400 gross tons per month as against 30,700 tons monthly in 1932. The decline which these rates reveal is emphasized by a comparison with exports in 1913 and in 1929. The pre-war volume was 242,300 tons per month and in 1929 the rate was 206,700 tons monthly. Thus the volume this year of 25,400 tons each month is only about one-tenth the pre-war volume and one-eighth that of 1929.

Pig Iron Daily Output Off 11.7 Per Cent in March

MARCH production of coke pig iron totaled 542,011 gross tons, compared with the February tonnage of 554,330. The March daily rate, at 17,484 tons, showed a loss of 11.7 per cent from the February rate of 19,798 tons daily. The output for the first quarter of this year was 1,665,126 tons, against 2,904,299 for the corresponding period last year, or a loss of 42.6 per cent.

Furnaces in operation on April 1 numbered 38, making iron at the rate of 15,580 tons daily, against 45 on March 1, with a daily operating rate of 18,910 tons. Eight furnaces were blown out or banked during March and one blown in, making a net loss of seven furnaces. The furnace put in operation belongs to an independent steel company. Five independent steel company furnaces, two Steel Corporation furnaces and one merchant unit were blown out or banked.

Among the furnaces blown out or banked are the following: One Carrie and one Mingo furnace of the Carnegie Steel Co.; one Cambria furnace, Bethlehem Steel Co.; one Trumbull-Cliffs, Republic Steel Corp.; one River furnace, Corrigan, McKinney Steel Co.; one Indiana Harbor unit of the Youngstown Sheet & Tube Co.; one Madeline, Inland Steel Co.; and the Neville Island furnace of the Davison Coal & Coke Co. The furnace blown in was a Monessen unit of the Pittsburgh Steel Co.

Production of Coke Pig Iron and Ferromanganese

	Gross Tons Pig Iron*		Ferromanganese†	
	1933	1932	1933	1932
January	568,785	972,784	8,810	11,250
February	554,330	964,280	8,591	4,010
March	542,011	967,235	4,783	4,900
April	852,897	.....	481
May	783,554	.....	5,219
June	628,064	.....	7,702
½ year.....	5,168,814	.....	33,562
July	572,296	.....	2,299
August	530,576	.....	3,414
September	592,589	.....	2,212
9 months.....	6,864,275	.....	41,487
October	644,808	.....	2,302
November	631,230	.....	5,746
December	546,080	.....	7,807
Year	8,686,443	.....	57,342

*These totals do not include charcoal pig iron. The 1932 production of this iron was 15,055 gross tons.
†Included in pig iron figures.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons)		April 1		March 1	
	March (31 Days)	February (28 Days)	Number in Blast	Operating Rate, Tons a Day	Number in Blast	Operating Rate, Tons a Day
New York:						
Buffalo	15,294	14,877	1	495	1	530
Other New York and Mass. ....	.....	.....	0	.....	0	.....
Pennsylvania:						
Lehigh Valley.....	18,265	18,598	2	590	2	640
Schuylkill Valley...	13,931	12,339	1	450	1	440
Susquehanna and Lebanon Valleys..	.....	1,206	0	.....	0	.....
Ferro. and Spiegel	2,575	1,191	1	85	1	90
Pittsburgh District..	84,894	72,954	6	2,410	7	2,605
Ferro. and Spiegel	2,208	2,132	1	70	1	75
Shenango Valley....	9,961	14,922	1	320	1	310
Western Pa.	15,429	12,495	1	495	1	445
Ferro. and Spiegel.	.....	5,394	0	.....	1	190
Maryland	30,923	25,598	2	1,000	2	915
Wheeling District....	66,178	64,104	3	1,620	4	2,290
Ohio:						
Mahoning Valley....	32,563	52,208	2	685	3	1,305
Central and Northern	71,178	79,953	2	2,135	2	2,940
Southern	26,472	13,651	1	855	1	715
Illinois and Indiana...	95,849	100,833	5	2,560	7	3,600
Mich., Wis. and Minn..	11,987	12,055	1	385	1	430
Colo., Mo. and Utah...	16,521	13,066	2	530	2	465
The South:						
Virginia .....	.....	.....	0	.....	0	.....
Kentucky .....	.....	7,172	0	.....	0	.....
Alabama	27,783	29,582	2	895	2	935
Ferromanganese .....	.....	.....	0	.....	0	.....
Tennessee .....	.....	.....	0	.....	0	.....
Total	542,011	554,330	38	15,580	45	18,910

Daily Average Production of Coke Pig Iron

	Gross Tons		
	1933	1932	1931
January	18,348	31,380	55,299
February	19,798	33,251	60,950
March	17,484	31,201	65,556
April .....	.....	28,430	67,317
May .....	.....	25,276	64,325
June .....	.....	20,935	54,621
½ year.....	.....	28,412	61,356
July .....	.....	18,461	47,201
August .....	.....	17,115	41,308
September .....	.....	19,753	38,964
October .....	.....	20,800	37,848
November .....	.....	21,042	36,782
December .....	.....	17,615	31,625
Year .....	.....	23,733	50,069

Merchant Iron Made, Daily Rate

1933	Tons	1932	Tons
January	2,602	January	6,256
February	2,863	February	7,251
March	2,412	March	7,157
April		April	5,287
May		May	4,658
June		June	6,090
July		July	3,329
August		August	3,070
September		September	3,213
October		October	4,286
November		November	4,435
December		December	3,674

Makes Boiler Tubes From Strip Steel

Steel & Tubes, Inc., Cleveland, a subsidiary of the Republic Steel Corp., announces the development of electric resistance weld boiler tubes, to be marketed under the trade name of Electrunite. These new tubes, it is emphasized, bear the approval of both the United States Department of Commerce Steamboat Inspection Service and the American Bureau of Shipping.

The tubing is formed from strip steel continuously, the strip being passed through a series of forming rolls. The round butted tube thus formed then passes under revolving

wheel-like copper electrodes where current travels from electrode to electrode through the butted seam of the tube. At the same time, pressure is applied which, together with the heat which is below the fusion temperature and which is confined to an area no larger than a pinhead, completes the weld. The tubing is later normalized and fully tested.

The manufacturer claims superiority in its product because of the extreme uniformity of diameter and wall thickness, and a fine strip steel surface quality inside and outside the tubes. It is available in all sizes up to 5 in. outside diameter, in copper bearing, nickel steel and Toncan iron, as well as the usual open-hearth steel.

A number of distributors have al-

ready been appointed, including John B. Astell & Co., Inc., New York; Williams & Co., Inc., Pittsburgh, Cleveland and Cincinnati; Chicago Tube & Iron Co., Chicago, and Service Steel Co., Detroit.

Biggs Boiler Works Co., Akron, Ohio, reports that its plant is busy on Government orders and brewery tank contracts which will insure steady operation for several months. A recent order is for two creosoting retorts, 7 ft. in diameter and 132 ft. long, and two other cylinders, 6 ft. in diameter and 110 ft. long, for the Union Pacific Railroad, to replace part of a plant at Portland, Ore., recently destroyed by fire.

SUMMARY OF THE WEEK'S BUSINESS

Steel Demands Broaden, Bringing Increase in Ingot Production

Automotive Orders and Brewery Requirements, Together With Miscellaneous Business, Aid Industry—March Pig Iron Output Off 11.7 Per Cent

A BROADENING in the demands for steel, aided by increasing production schedules in the automobile industry and requirements of the resuscitated brewing industry, has lifted ingot output to 16½ per cent of the country's capacity from 15 per cent last week.

Some individual units of the industry have had a surprising influx of orders, principally in last-minute specifications against low-priced first quarter sheet contracts, which the mills insist must be shipped by April 15. Thus, a leading independent maker of flat-rolled steel is able this week to double its sheet mill operations, having had the largest tonnage for any single week in three years.

At Chicago, ingot production has gained two points to 13 per cent of the district's capacity because of a better miscellaneous demand as well as orders for sheets for beer barrels and releases of 5000 tons of rails for a Western road and reinforcing bars for highway construction. A further gain in operations is likely before the end of the week. In the Valleys there has been a slight increase in steel-making activity, and resumption by a large plant in that district within a few days may bring a further gain. In other districts there has been no substantial increase in output of ingots, but finishing mill schedules have been stepped up, particularly in the lighter products, including tin plate, average output of which now exceeds 40 per cent of the total capacity.

THE most cheering news to the steel industry is the pick-up in the automobile industry, which has been and still is under the depressing influence of the banking situation, though release of frozen deposits is making progress. While the automobile industry is taking a cautious course, it has been encouraged by improvement in retail sales. Chevrolet has released steel orders and Ford business in increased volume is expected shortly.

Brewery tonnage is coming out more freely. Sheet business at Chicago has been considerably improved by orders from manufacturers of steel beer kegs, one of whom plans on an output of 4000 a day. Sheets, small angles and wire have been bought in various districts for beer bottle cases. Motor truck business is also being stimulated by brewers' needs.

Nearby prospects for building construction have been dealt a severe blow by the decision of the Federal Government to take no immediate action on public work for which contracts have not yet been let. Thus,

about 40 buildings on which bids have been taken or were about to be called for have been delayed. Meanwhile, a new public works program, estimated to cost \$3,000,000,000, is under consideration at Washington. The week's structural steel lettings were 20,300 tons, of which 10,500 tons is for a Federal Court House in New York.

THE dip in business caused by the recent bank holiday is illustrated by the blast furnace production figures for March, which show a falling off of 11.7 per cent in the daily pig iron output last month as compared with February. The March total was 542,011 gross tons against 554,330 in February, while the daily average last month was 17,484 tons compared with 19,798 tons in February. First quarter output was 42.6 per cent below that of the corresponding period in 1932. There was a net loss of seven furnaces during the month, leaving 38 in blast on April 1, with a daily operating rate of 15,580 tons. Only one month of last year, August, showed a poorer pig iron record than the past month.

Meanwhile, merchant pig iron sale has shown an encouraging improvement. One large consumer has covered its requirements for the remainder of the year for all of its plants. A stiffening of prices is apparent in nearly all districts, with prospects of some outright advances in the near future, while the \$1 a ton higher level recently announced in eastern Pennsylvania has been established by small-lot sales, bringing about the first increase to \$13.68, in THE IRON AGE composite pig iron price since May, 1929, since when there has been an average drop of \$5 a ton.

THE IRON AGE composite price for finished steel has declined to the lowest level since the World War because of a sharp reduction in prices of steel pipe, amounting to \$7 a ton in the case of the base sizes, 1 to 3 in., in butt-weld, but running as high as \$33 a ton on large-sized galvanized pipe. The present composite price is 1.879c. a lb. compared with 1.923c., and is \$2.32 a ton below the lowest monthly average price in early 1922, the previous post-war period of lowest steel prices.

Scrap markets are strong, and there have been scattered advances on a number of grades in various districts, but heavy melting steel has not been affected in the principal markets. Hence, THE IRON AGE composite price on that grade remains at \$7.08 a gross ton. A Southern railroad will scrap 16,000 freight cars.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	Apr. 4, 1933	Mar. 28, 1933	Mar. 7, 1933	Apr. 5, 1932
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$14.34	\$13.34	\$13.34	\$15.59
No. 2, Valley furnace.....	14.50	14.50	14.50	15.00
No. 2, Southern, Cin'tl.....	13.82	13.82	13.82	13.82
No. 2, Birmingham.....	11.00	11.00	11.00	11.00
No. 2 foundry, Chicago*.....	15.50	15.50	15.50	16.00
Basic, del'd eastern Pa.....	14.00	13.50	13.50	16.00
Basic, Valley furnace.....	13.50	13.50	13.50	14.50
Valley Bessemer, del'd P'gh..	16.89	16.89	16.89	17.39
Malleable, Chicago*.....	15.50	15.50	15.50	16.00
Malleable, Valley.....	14.50	14.50	14.50	15.50
L. S. Charcoal, Chicago.....	23.17	23.17	23.17	23.17
Ferromanganese, seab'd car- lots.....	†68.00	68.00	68.00	75.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Contract price; spot quotation.

Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$43.00
Light rails at mill.....	30.00	30.00	30.00	34.00
Rerolling billets, Pittsburgh.	26.00	26.00	26.00	27.00
Sheet bars, Pittsburgh.....	26.00	26.00	26.00	26.00
Slabs, Pittsburgh.....	26.00	26.00	26.00	27.00
Forging billets, Pittsburgh..	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.50

Finished Steel

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.60
Bars, Chicago.....	1.70	1.70	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.65	1.65
Bars, New York.....	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh....	1.60	1.60	1.60	1.60
Tank plates, Chicago.....	1.70	1.70	1.70	1.70
Tank plates, New York.....	1.598	1.648	1.648	1.898
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago..	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	2.00
Hot-rolled strips, Pittsburgh.	1.45	1.45	1.45	1.40
Cold-rolled strips, Pittsburgh	1.80	1.80	1.80	2.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.00	2.00	2.00	2.00
Hot-rolled annealed sheets, No. 24, Chicago dist. mill.	2.10	2.10	2.10	2.30
Sheets, galv., No. 24, P'gh.	2.60	2.60	2.60	2.85
Sheets, galv., No. 24, Chicago dist. mill.....	2.70	2.70	2.70	2.95
Hot-rolled sheets, No. 10, P'gh	1.40	1.40	1.40	1.55
Hot-rolled sheets No. 10, Chi- cago dist. mill.....	1.50	1.50	1.50	1.65
Wire nails, Pittsburgh....	1.85	1.85	1.85	1.95
Wire nails, Chicago dist. mill	1.90	1.90	1.90	2.00
Plain wire, Pittsburgh.....	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill	2.15	2.15	2.15	2.25
Barbed wire, galv., Pittsburgh	2.35	2.35	2.35	2.60
Barbed wire, galv., Chicago dist. mill.....	2.40	2.40	2.40	2.65
Tin plate, 100 lb. box, P'gh.	4.25	4.25	4.25	4.75

Old Material

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh..	\$9.25	\$9.25	\$8.50	\$10.25
Heavy melting steel, Phila...	6.75	6.75	6.75	7.25
Heavy melting steel, Ch'go..	5.25	5.25	5.25	7.12½
Carwheels, Chicago.....	8.00	8.00	8.00	7.00
Carwheels, Philadelphia.....	8.50	8.00	8.00	9.50
No. 1 cast, Pittsburgh.....	9.00	9.00	9.00	9.50
No. 1 cast, Philadelphia.....	8.00	8.00	8.00	9.50
No. 1 cast, Ch'go (net ton)..	6.75	6.25	6.25	7.00
No. 1 RR. wrot., Phila.....	7.50	7.50	7.50	8.50
No. 1 RR. wrot., Ch'go (net)	4.50	4.50	4.50	5.50

Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$1.75	\$1.75	\$1.75	\$2.25
Foundry coke, prompt.....	...	...	2.50	3.50

Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Electrolytic copper, refinery..	4.75	4.75	4.75	5.75
Lake copper, New York.....	5.00	5.00	5.00	6.12½
Tin (Straits), New York....	24.00	24.25	...	19.60
Zinc, East St. Louis.....	3.00	3.00	...	2.80
Zinc, New York.....	3.37	3.37	...	3.17
Lead, St. Louis.....	2.87½	2.87½	2.87½	2.90
Lead, New York.....	3.00	3.00	3.00	3.00
Antimony (Asiatic), N. Y....	5.80	5.95	5.62½	6.05

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel

April 4, 1933	1.879c. a Lb.
One week ago	1.923c.
One month ago	1.923c.
One year ago	1.970c.

Based on steel bars, beams, tank plates, wire rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.

	High	Low
1933.....	1.948c., Jan. 3;	1.879c., Apr. 4
1932.....	1.977c., Oct. 4;	1.926c., Feb. 2
1931.....	2.037c., Jan. 13;	1.945c., Dec. 29
1930.....	2.273c., Jan. 7;	2.018c., Dec. 9
1929.....	2.317c., April 2;	2.273c., Oct. 29
1928.....	2.286c., Dec. 11;	2.217c., July 17
1927.....	2.402c., Jan. 4;	2.212c., Nov. 1

Pig Iron

\$13.68 a Gross Ton
13.56
13.56
14.35

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
\$13.68, Apr. 4;	13.56, Jan. 3	
14.81, Jan. 5;	13.56, Dec. 6	
15.90, Jan. 6;	14.79, Dec. 15	
18.21, Jan. 7;	15.90, Dec. 16	
18.71, May 14;	18.21, Dec. 17	
18.59, Nov. 27;	17.04, July 24	
19.71, Jan. 4;	17.54, Nov. 1	

Steel Scrap

\$7.08 a Gross Ton
7.08
6.83
8.21

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low
\$7.00, Mar. 21;	\$6.75, Jan. 3	
8.50, Jan. 12;	6.42, July 5	
11.33, Jan. 6;	8.50, Dec. 29	
15.00, Feb. 18;	11.25, Dec. 9	
17.58, Jan. 29;	14.08, Dec. 3	
16.50, Dec. 31;	13.08, July 2	
15.25, Jan. 11;	13.08, Nov. 22	

Pittsburgh Steel Orders Gain; But Production is No Higher

Valley Output, However, is Slightly Improved—Pipe Prices Reduced—Scrap Strong But Unchanged

PITTSBURGH, April 4.—While there is some evidence of improved releases for finished steel products in this district, the aggregate increase has not yet been sufficient to bring about a gain in production schedules. Specifications for sheets and wire products were heavier last week because of the expiration of old low-priced contracts on March 31, but the heavier steel products remain very quiet.

Demand for sheets, bars and strip steel from the automotive industry has registered limited improvement, but no railroad buying has appeared, and demand for structural steel and reinforcing bars has been influenced adversely by temporary holding up in the letting of Government contracts.

Steel ingot production in the Pittsburgh district is unchanged at 13 per cent of capacity, while limited improvement has occurred in the Valleys and nearby northern Ohio plants. The Youngstown district rate may now be estimated at 14 per cent of capacity, although resumption at a large plant in that territory later in the week may boost production. In the Wheeling district output is holding its own.

Tin mill schedules have risen over the recent 40 per cent rate, and sheet mill operations have improved.

The sharp decline in pipe prices announced last week by a leading maker will probably serve to stabilize the market, which has been rather weak. On other finished steel products, quotations are well maintained, the end of the quarter having brought in final specifications on many contracts taken at prices under the current market.

Raw materials continue strong, although scrap has not gained further in the last week. Pig iron producers are making efforts to stabilize quotations at current levels, and some talk of an advance has been heard.

Pig Iron

Despite reports of activity in other markets, the local situation has not changed materially, and sellers report only minor increases in orders. A little inquiry is coming out, but no amount of more than 200 tons is involved. The larger radiator and sanitary ware makers in the district have made no purchases. Jackson County, Ohio, producers of silvery iron and Bessemer ferrosilicon have withdrawn all prices. Prices are slightly firmer.

Semi-Finished Steel

Scarcely any second quarter contracting on billets, slabs and sheet bars is reported, as consumers have not exhausted their first quarter con-

tracts in most instances. The price of \$26, Pittsburgh or Youngstown, is holding, while forging billets are firm at \$31. Demand for wire rods is light, and the \$35, Pittsburgh or Cleveland, price is not subject to much question.

Rails and Track Accessories

The Erie is still reported to be contemplating the placing of a tonnage of rails, but no formal inquiry has appeared. None of the other Eastern roads is in the market, and releases of accessories are at a minimum. The local rail mill may accumulate enough tonnage this month to provide a short run.

Bolts, Nuts and Rivets

This district is receiving scarcely any automotive tonnage, and the other large consuming industries are dormant. Prices are well maintained.

Bars, Plates and Shapes

The holding up of Federal projects on which bids have already been taken has further depressed the structural steel industry in the last week. Inquiry is appearing in fair volume, but improvement in the number of small jobs is looked for with the coming of open weather. The same can be said for reinforcing bars, which are very dull. A sewer at Louisville, Ky., will require 1200 tons of bars. Merchant bars continue inactive, with alloy steel material going to the automobile industry in insignificant volume. The second quarter plate requirements of the railroads were generally small, and some contracts placed will not likely be specified against to any extent. A number of river barge purchases are in prospect, but buyers are delaying commitments until a turn of general business conditions. Prices on bars, plates and shapes are unchanged at 1.60c., Pittsburgh, with few deviations reported. Reinforcing bars are quoted at 1.40c., Pittsburgh, for mill lengths.

Cold-Finished Steel Bars

A slight gain in demand from the automobile industry is reported by a few makers, but orders continue unusually small. The price is well held.

Tubular Goods

A reduction of \$7 a ton in the base price of butt weld black pipe was announced on March 29 by the leading maker. The base discount to the consumer on 1 to 3 in. butt weld pipe is now 71 per cent off list, as compared with 67½ per cent since September,

1932. Changes in the other sizes are slightly larger in some instances. Corresponding reductions on galvanized pipe are somewhat larger, amounting to \$10 a ton on 1 to 3 in. to as much as \$33 on 12 in. The discount for plain ends, which was formerly one point, has been increased to 2 points on 3 in. and smaller material, and 3 points on the larger sizes. Seamless oil country goods have been reduced approximately \$3 a ton. The reductions are being followed by the leading independents, and was not entirely unexpected in the trade because of recent drastic shading by small companies in certain centers. Demand for pipe shows no marked change.

Wire Products

Movement of merchant wire products continues to show limited improvement, but the manufacturers' grade is very dull. Specifications against old low-priced contracts brought some increase in tonnage last week. Orders now on mill books are generally at the prevailing quoted levels of \$1.85 a keg for nails, and 2.10c., Pittsburgh, for manufacturers' wire.

Sheets

Most producers had heavier releases in the last week of the month because of the desire of consumers to take advantage of old low-priced contracts. Nevertheless, specifications were principally for rush shipment, and indicate no tendency toward speculative replacement of stocks. Forward contracting is proceeding at a fair rate, and mills are adhering closely to quoted prices. Operating schedules have risen to about 15 per cent, with full finishing units engaged at a much better rate than they were last week. Announcement of an advance in galvanized sheets, which had been expected this week, has failed to appear, but efforts to preserve a 2.60c., Pittsburgh, minimum have been redoubled.

Tin Plate

Somewhat heavier releases have brought about a slight increase in production, and the industry is now operating at a little better than 40 per cent of capacity. Current output is generally for immediate shipment, as anticipated tonnage has generally been rolled.

Strip Steel

This market has developed a slightly brighter tone, with heavier orders from the automotive industry in prospect. Some of the motor car builders have again begun to release strip, although their requirements are not as large as had been the case prior to the bank holiday. The price on hot-rolled material is well maintained at 1.45c., Pittsburgh, while cold-rolled continues quotable at 1.80c. to 2c.

Coal and Coke

The prospect of a strike in nearby coal producing centers has had no effect on the market. Scarcely any

mines have been closed, and consumption of coal and coke does not show any marked increase. Foundry coke is comparatively in the best demand, although prices are very weak.

Scrap

While the scrap market continues strong, recent sales into consumption scarcely justify higher quotations this week. One mill has been able to buy heavy melting steel at \$8.75, although only a small tonnage was involved. On the other hand, a small lot of railroad steel recently brought \$10.25, and it is indicated that bids on the current Pennsylvania Railroad list developed a price at least this high. Dealers are

having difficulty in buying against old orders, and little scrap is moving into the district from either the East or the Detroit territory. Machine shop turnings are stronger. A Southern railroad has completed plans for the scrapping of 16,000 freight cars and a number of locomotives. It is estimated that as much as 200,000 tons of scrap will be produced by this road over the next year. A group of dealers have arranged to export some of this material, while the remainder will be sold to American consumers. It is believed that not much of the material will reach the Pittsburgh district, although some of it may move up the Ohio River to plants not far distant.

with a railroad consolidation plan. While railroads are in a serious plight because of insufficient revenue, railroad workers continue to resist further wage reductions, and industries and agriculture complain of high freight rates.

Seattle Jobbers Reduce Prices on Sheets

SAN FRANCISCO, April 3.—Seattle warehouses have reduced prices of sheets to 4.25c. a lb. for No. 24 hot-rolled annealed, 3.50c. for No. 10 hot-rolled, and 4.75c. for galvanized, bringing them more closely in line with San Francisco quotations.

With a bid of \$1,821,292, the Clinton Construction Co. is low on the Yerbe Buena Island crossing (contract No. 5) of the San Francisco-Oakland bridge, which will require 2200 tons of reinforcing bars and 1500 tons of shapes, in addition to 1500 tons of plates not included in the contract. The Healy-Tibbitts Construction Co. is low, at \$1,036,500, on the San Francisco anchorage (contract No. 3), which will require 1840 tons of reinforcing bars and 225 tons of timber fastenings. Low bids on contracts Nos. 2 to 7, inclusive, will be presented soon to the Reconstruction Finance Corp. for review, and awards are expected early in May.

Bids on the San Francisco county jail, calling for 650 tons of reinforcing bars and 1500 tons of structural steel, have been postponed to April 12.

Confidence Gains in Great Britain; Continental Cartel in Agreement

LONDON, ENGLAND, April 3 (By Cable).—Iron and steel business in the United Kingdom is improving. Additional furnaces have been put into operation. There are on every hand evidences of increasing confidence. Tin plate demand is quiet, but some works are preparing to shut down rather than accept lower prices.

Somewhat to the surprise of the Continental steel market, a basic agreement has been secured among German, Luxemburg, Belgian and French steelmasters regarding the establishment of selling offices for

semi-finished steel, joists, bars, plates, thick sheets and flat billets. The arrangement was made possible by a German-Belgian compromise regarding the quota basis and fines. Further negotiations will take place on April 8, when certain details are to be settled before the selling offices can function. Most of the Continental steel works have withdrawn from the market, and prices are nominal.

Poland complains that the Continental Steel Cartel has launched a strong offensive on Polish export and home markets with the object of forcing her into the cartel or concluding a pact regarding sales territories.

All-Water Steel Shipment From Pittsburgh to Coast

The Pittsburgh Steel Co. recently dispatched a tow of two barges of nails, wire and pipe, totaling about 1200 tons, from its Monessen, Pa., plant, for delivery on the Pacific Coast by an all-water route. The material will be transferred from the barges to ocean steamers at New Orleans for trans-shipment through the Panama Canal. Approximately \$3 a ton will be saved in freight charges, as compared with the usual routing of shipments to the Atlantic Coast by rail for trans-shipment through the Canal. This move follows soon after Pittsburgh district independent steel makers formally protested the comparatively high freight rates charged on shipments to Atlantic seaboard points for trans-shipment to the Pacific Coast. A parity with shipments for export was asked.

Colonial Steel Co., Monaca, Pa., subsidiary of the Vanadium Alloys Steel Co., Latrobe, Pa., will resume production April 10 on its sheet mill and 9-in. and 16-in. bar mills. Output will be required partially for the replacement of mill and warehouse stocks, and also to fill recent large orders for copper-clad steel.

Freight Rate Hearings Ordered by I. C. C.

WASHINGTON, April 4.—The Interstate Commerce Commission is expected to make an early announcement as to times and places for the hearings it has ordered to determine whether or not railroads should make reductions in freight rates. The order for the hearings, issued last Saturday, is so broad that it covers all products.

It is the outgrowth of a joint petition asking for reduced rates on basic commodities filed by the National Coal Association, the National Lumber Manufacturers' Association and various agricultural groups. In oral arguments on the petition, shippers in virtually all lines supported the petition, while it was strongly opposed by the railroads. State regulatory bodies have been informed of the order for the investigation so that they may participate in the proceedings.

The order was announced shortly before President Roosevelt conferred with representatives of the railroads and railroad labor regarding the proposed railroad program of the administration. Rail wages and rates are included in the many points connected

British Prices f.o.b. United Kingdom

Ports		Per Gross Ton	
Ferromanganese,			
export	£9		
Billets, open-hearth	£5	to	£5 7s. 6d.
Black sheets, Japanese specifications	£11		
Tin plate, per base box	15s. 6d.	to	16s.
Steel bars, open-hearth	£7 17½s.	to	£8 7½s.
Beams, open-hearth	£7 7½s.	to	£7 17½s.
Channels, open-hearth	£7 12½s.	to	£8 2½s.
Angles, open-hearth	£7 7½s.	to	£7 17½s.
Black sheets, No. 24 gage	£8 10s.		
Galvanized sheets, No. 24 gage	£10 10s.	to	£10 15s.

Continental Prices, f.o.b. Continental

Ports	
(Nominal)	
<i>Per Metric Ton, Gold £ at \$4.86</i>	
Billets, Thomas...	£2 2s.
Wire rods, No. 5 B.W.G.	£4 10s.
Black sheets, No. 31 gage, Jap- anese	£11 5s.
Steel bars, mer- chant	£2 6s.
Beams, Thomas...	£2 4s.
Angles, Thomas, 4-in. and larger	£2 6s.
Angles, small...	£2 8s.
Hoops and strip steel over 6-in. base	£3 10s.
Wire, plain, No. 8	£5 7s.
Wire nails.....	£5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G..	£8 15s.

Chicago Steel Ingot Output Rises as Orders Improve

Automobile Orders and Brewery Business Are Aids—Western Railroad Releases 5000 Tons of Rails

CHICAGO, April 4.—Ingot output in the Chicago district has gained about two points to 13 per cent of capacity, and the outlook is favorable for a further climb as the result of releases for 5000 tons of rails which have been on order for some time. Releases of reinforcing bars for highway work are an aid to the market, and specifications from some automobile manufacturers are also helpful.

Retail sales of automobiles climbed sharply in Illinois during the closing days of March, as buyers rushed for delivery before the State retail sales tax became effective.

The sheet market is particularly active, being given aid by the manufacture of steel beer kegs and also an upswing in miscellaneous demand. Inquiry for tie plates is larger, and tank shops are releasing more steel.

The railroad equipment market remains dull except for an order for 42 cars for export.

Scrap, though having a stronger undertone, is still moving in small quantities, and not all grades have felt the impulse of better demand.

Price structures all along the line show firmness.

Pig Iron

Shipments of Northern foundry iron continue to gain momentum, and the outlook as April starts is that the month as a whole will show improvement. Sales are not as active as in late March, though there is still a substantial volume being added to books. Fresh inquiries also have fallen off. Prices remain firm at \$15.50 a ton, local furnaces, with differentials at 25c. One merchant stack remains active.

Cast Iron Pipe

Demand for cast iron pipe remains very dull, and sellers are centering their attention on the Chicago pumping plant project, on which steel pipe producers are attempting to interest the engineers. There is less certainty to the price structure, especially in Missouri, where very low quotations have recently been made. Current business near Chicago is confined to light tonnages, such as for a small filter plant at Mt. Carmel, Ill.

Reinforcing Bars

This market remains quiet and inquiries offer little encouragement to dealers. Going tonnages are all small and rather widely scattered. The 1000-ton job for the Chicago Carbon Co. is still pending and brewery con-

struction should provide some tonnage. The Indiana road letting has been postponed to April, the tentative date having been set for the 18th of the month. Prices are holding on such work as is being let.

Warehouse Business

Indications are that April in the warehouse business will show a reversal of its usual trend by recording shipments above the March level. The closing days of last month showed a modest pick-up in orders. Warehouse prices are holding.

Rails and Track Supplies

A Western railroad has released about 5000 tons of rails against an old contract. Specifications for track accessories are steady, and inquiries have turned up rather sharply. One railroad is inquiring for 500 tons of tie plates and another for 1600 tons.

Bolts, Nuts and Rivets

The very moderate change upward in demand noted late last month has disappeared, but sellers are inclined to look upon this situation as a fluctuation that may occur under almost any market condition. Contracting for the second quarter has come to an end. Prices are unchanged.

Wire Products

Both new buying and specifications show growth, and wire mills are now producing at about 25 per cent of capacity, with some units above this level. The automobile industry is responsible for part of this improvement. Rural areas are as yet contributing little to the general business situation. Prices of farm products have made little headway, and national legislation aimed at helping the farmer is still in the making. Further, there are still a great many outlying banks that have not yet been reopened. On the whole, producers of wire are rather satisfied with the outlook, and they believe the present rate of growth is on solid ground. Miscellaneous demand is slow to regain ground lost during the bank moratorium.

Structural Material

The outlook is not encouraging in the absence of private work. Even public projects are light, awards totaling only 1600 tons and new inquiries only 400 tons. A few small structures are being placed for the Chicago World's Fair. Shops throughout this area are subsisting on very light schedules and there seems to be

little chance for betterment in the near future.

Sheets

The local sheet market is being materially helped by the manufacture of steel beer kegs. There is also improvement in miscellaneous demand, with the result that output is in the range from 25 to 30 per cent of capacity. It is reported that one maker of steel beer kegs plans production of 4000 kegs a day.

Bars

Shipments of bar mill products are gaining, owing to the increased activity among automobile manufacturers. A slight gain in use by miscellaneous consumers is noted. One bar mill in this district is operating at about 25 per cent of capacity and will maintain this rate for a week or 10 days on orders at hand.

Plates

Rolling of plates for use at Hoover Dam has materially helped local schedules. The subject of railroad cars for the transport of beer is alive at this time. The United Fruit Co. has ordered 42 cars for export. An aqueduct at Los Angeles, Cal., calls for 4100 tons. The Denver, Colo., pipe line is still pending.

Scrap

The scrap list continues to gain strength, but actual advances in prices are still confined to cast and malleable grades. A steel mill has taken 1500 tons of heavy melting steel at \$5.50 a gross ton, delivered. Accumulations of this grade are still being made on local docks. The price differential between Lake Erie ports and Chicago is favorable to boat movement from Chicago. Interest in cast iron borings is increasing, and users are finding the supply short because of limited shop operations. Railroad lists are heavy, and dealers are of the opinion that much of the offered scrap will actually be sold. Offerings are being made by the Rock Island, Alton, the Milwaukee Road, Pere Marquette, Wabash, Pennsylvania and the New York Central.

Manufacturer Agrees Not To Use Phrase "All Steel"

WASHINGTON, April 4.—The words "All Steel" or "All Metal" will no longer be used in advertising sheet metal products and refrigerators as sold by a certain corporation, according to a stipulation made with the Federal Trade Commission. The name of the corporation is not revealed. The stipulation also provides that the words "steel" and "metal" shall not be used in any way, the commission announced, "to deceive purchasers into believing that such products are constructed in their entirety of steel or metal when this is not true."

Eastern Pennsylvania Trade Shows a Mild Improvement

Consumers More Interested in Forward Requirements—Pig Iron Advance Established—Scrap Strengthens

PHILADELPHIA, April 4.—Some steelmakers in the eastern Pennsylvania district report a slight increase in volume of orders for miscellaneous lines. Others report that there has been no improvement. There is, however, greater interest with respect to forward requirements. There is a greater frequency of inquiries looking to protection through either the third quarter or over the remainder of the year at present prices, but makers are declining to quote beyond the second quarter.

The new scale of prices for pig iron, representing a rise of \$1 for No. 2 foundry, has been established on the basis of sales. Several grades of scrap have risen 50c. a ton.

The lighting of an additional open-hearth furnace has increased steel-works operations a half point to 10½ per cent of capacity.

Pig Iron

Domestic furnaces have established higher prices on pig iron as the result of small sales at the recently named levels. No. 2 plain foundry iron is now \$13.50, furnace, an increase of \$1. Silicon differentials of 25c. establishes No. 2X at \$13.75 and No. 1X at \$14. Basic iron is quoted at \$13.25, furnace, or \$14.09, delivered, and malleable iron at \$14.50, furnace. There is less competition from Royal Dutch iron, and this fact together with a firmer tone reported for the foreign material is held to give greater strength to domestic iron. The higher prices have brought more inquiries to furnaces, with melters showing interest for coverage beyond the second quarter.

Plates, Shapes and Bars

Makers of shapes and merchant steel bars report that the market is holding well at 1.60c., Eastern mills, for standard shapes, 1.70c., Eastern mills, for wide flange material and 1.60c., Pittsburgh, for bars. Plates appear to be improved somewhat in tone, though still irregular at 1.40c. to 1.50c., Coatesville, for carlots. Plate makers have announced a new card of extras effective April 1. They set up four new features. They cover extras for "platons," heavy gage plates over 2-in. thick; for flame or gas cutting; for normalizing and for special tests, classified under restrictions or refinement.

Sheets

A local automobile body builder has resumed operations and released some fair-sized tonnages of sheets and strip

steel. Miscellaneous inquiry for sheets is slightly better. Prices are reported to be firm. Makers are refusing to quote beyond the second quarter, feeling that a further rise in levels will be made for the third quarter.

Imports

The following iron and steel imports were received here last week: 4543 tons of chrome ore from Yugoslavia, 5 tons of galvanized steel strips and 1 ton of steel stripping from England.

Scrap

Greater strength has developed in the scrap market. Sales have brought about increases of 50c. a ton in several grades, including heavy breakable cast, rolled steel wheels and carwheels. Sales of the larger tonnages of carwheels have gone generally at \$8.50, though some tonnage of this grade is reported to have been sold at as high as \$9. When compared with the present rate of steel operations, there is no local scarcity of scrap, but should sizable orders come to the mills, scrap supplies would be quickly exhausted and higher prices would develop. A nearby mill has purchased tonnages of No. 2 heavy melting steel and old compressed sheets.

Canadian Business Shows No Signs of Revival

TORONTO, April 3.—A delegation from Nova Scotia waited upon the Dominion Government last week with a proposal that the Government furnish sufficient money to finance the labor cost of manufacturing 50,000 tons of steel rails and mining the necessary coal. The Dominion Steel & Coal Co., Sydney, N. S., would carry out the order, using its own raw materials, and wait for its share of the operation until the railway companies have purchased the output. Eventually the money advanced by the Government would be returned. R. B. Bennett, Prime Minister, informed the delegation that the proposal would receive the sympathetic consideration of the Government and that, if it were possible to arrange the necessary financing, the plan would be carried out.

The steel mills at Sydney are practically shut down. The Dominion Steel & Coal Co. recently completed a 15,000-ton steel rail contract for the Eastern division of the Canadian National Railways, and has no further contracts on hand. Canadian rail-

way companies are not in the market for rails at this time, chiefly because of their programs of retrenchment. The proposition submitted to Ottawa is to enable the steel company to resume operations and relieve the unemployment situation in the province.

The general outlook for new business in the Canadian iron and steel industry is not bright at the moment, but some interests are of the opinion there may be some revival later in the year.

While the Imperial Economic Conference held in Ottawa last summer gave hopes for early improvement in business in this country, these hopes failed to materialize and it is now the opinion in most quarters that the conference was a failure insofar as its proposed objectives were concerned. It is a fact, however, that the United Kingdom has increased its purchases of steel in the Canadian markets and there has been some improvement in iron and steel imports from Britain, but this interchange has failed to lift the Canadian industry out of its state of almost entire stagnation, and there is no immediate prospect of early changes for the better.

Birmingham Steel Trade Has Shown Improvement

BIRMINGHAM, April 4.—The second quarter begins with no appreciable improvement in foundry melt and none in early prospect. The pressure pipe people are hopeful of better tonnage, but current business is still comparatively small and irregular. March turned out better than expected, in view of the bank holiday. Shipments of the three merchant producers were about equal to those of February. Interest is said to be slightly better, but is producing no additional tonnage to speak of. In many localities the banking situation has not cleared up and is holding back a number of foundries. The price of \$11 for the Southern market is firm. Furnace operations still are limited to two stacks, one on foundry iron and one on basic. Woodward Iron Co. had planned to switch from No. 3 furnace to No. 2 furnace this week, but has now decided to continue without change.

Steel

The past three weeks, since the banking holiday, have been progressively better for the two manufacturers of steel in this district, resulting in March bookings going slightly ahead of those for February. Orders are still mostly small and scattered, but they have been more numerous. Open-hearth production last week was the best in many weeks. Throughout the week operations ranged from five to six active units as compared to three to five for several weeks previous. Prices are unchanged.

Cleveland Steel Orders Gain; Greater Diversity of Buyers

Automobile Industry Releases Some Tonnage—Sheets and Angles Bought for Beer Bottle Cases

CLEVELAND, April 4.—Miscellaneous orders for finished steel increased moderately the past week, and there was a slight further gain in the demand from the automotive industry. The feeling in the steel industry is somewhat more optimistic than it has been, although recovery is expected to be slow. While the banking situation in Ohio has improved, it is still bad and it probably will be some time before normal conditions are restored.

There was considerable increase in the number of manufacturing consumers who ordered steel during the week. While the purchases are still small, some are for car lots. Buying by the automobile manufacturers also is mostly in small lots to round out the stock for early requirements. However, some round-lot business is expected from that source during the latter part of the month. While some of the automobile manufacturers, particularly the Chevrolet Company, are restoring the schedules that were disrupted by the bank holiday, they are following a cautious policy and will limit production to sales.

Ingot output in Cleveland is unchanged at 32 per cent of capacity, although it was stepped up three points for two days this week by the operation of an additional furnace by the Corrigan, McKinney Steel Co. Some stimulus is being given the steel business by the demand from the breweries for motor trucks and for beer bottle cases. Substantial orders were placed here during the week for sheets and for small angles for manufacturing the cases. However, expected round tonnages of plates for tanks and vats so far have not developed in this territory.

Railroad business is at a standstill, but is expected to show some revival when the Administration's railroad policy is announced.

Prices are being well maintained. The only change is the decline on steel pipe amounting to \$7 a ton and more.

Pig Iron

Sales continue very light, with business confined to small lots. Shipping orders have improved, and producers expect that April will show a moderate gain in sales. Increased activity by the Ford Motor Co. is reflected in a better demand from foundries making malleable castings for that company. Stove manufacturers also are ordering iron slightly more freely. Jobbing foundries report no improvement in operations. Prices

are unchanged at \$13.50 to \$14, Lake furnace, for foundry and malleable grades for outside delivery and \$15, Cleveland, for local delivery.

Iron Ore

No seasonal interest has as yet developed in iron ore, and there is little, if any discussion of prices, which may not be established for several weeks.

Sheets

New business showed a moderate increase the past week. Some fair-sized orders for black sheets were placed for the manufacture of beer bottle cases, additional business came from the refrigerator industry and some tonnage was placed by steel barrel manufacturers whose business has revived slightly. Recently established prices appear to be maintained on new business, and producers are adhering to the new classifications.

Strip Steel

Some of the General Motors units issued releases during the week for hot and cold-rolled strip, due on old orders, which will cover their requirements for two weeks, but apparently have not yet decided on their production schedules for the last half of the month. Some business has also come from refrigerator manufacturers. Demand from other sources is light. Prices are steady at 1.45c., Pittsburgh, for hot-rolled strip and at 1.80c., to 2c., Cleveland, for cold-rolled material.

Bolts and Nuts

Releases in fair volume have come from the motor car industry the past week, but March suffered quite a setback, as compared with February because of the bank holiday. The Ford Motor Co. has become a more active factor, having placed sizable orders for nuts. Prices are steady.

Bars, Plates and Shapes

Public construction work is almost at a standstill, and little activity in highway work is expected until the plans of the new Administration for participating with the States in road building programs are announced. The State of Pennsylvania took bids during the week for several bridges requiring 500 tons. With the announcement that the Reconstruction Finance Corp. will render financial aid in the construction of the proposed Grand Island bridges at Niagara Falls and Tonawanda, N. Y., it is expected that these projects will go ahead. They will require 12,000

tons of steel. The Sun Oil Co. will erect several tanks in Cleveland, requiring a small tonnage of plates. Prices are steady at 1.65c., Cleveland, for bars and 1.60c., Pittsburgh, for plates and shapes.

Scrap

The market has a firmer tone, but in the absence of buying prices are unchanged. A local consumer has suspended shipments of blast furnace scrap, but is expected to release some steel-making scrap this week. Dealers are paying \$7 for No. 1 heavy melting steel for Cleveland delivery, but the supply is not plentiful.

St. Louis Pig Iron Prices Firm; Scrap Higher

ST. LOUIS, April 4.—Ordering of pig iron continues in small volume and for shipment not later than June 30. Pending inquiries have not developed into contracts, but melters are hopeful they will shortly. Prices have firmed considerably, concessions having been less in evidence.

Steel

While sentiment in the steel trade is more hopeful and the price situation generally firmer, actual business continues to be light. Warehouse trade during March was slightly better than in February, owing to the extra business days and orders for material for repairs in breweries. In addition to 6500 tons of structural steel, 900 tons of reinforcing bars will be required for the St. Louis Federal Building; bids were opened today.

Scrap

Dealers are said to be having difficulty in filling contracts recently made and are paying higher prices for some items. No. 1 heavy melting steel and rails for rolling are 75c. a ton higher; steel rails less than 3 ft., cast iron car wheels and No. 1 machinery cast are 50c. up. The Missouri Pacific has returned to the system of offering its scrap by carloads, with a list of 157 carloads. Other lists: Wabash, 5000 tons, including 2650 tons of heavy melting steel; Alton, 5000 tons.

An annual non-ferrous meeting will be held by the Cleveland chapter of the American Society for Steel Treating at the Cleveland plant of the Aluminum Co. of America, April 10. Dr. Francis C. Frary, New Kensington, Pa., director of research of the company, will give an address on "Aluminum and Its Alloys" and G. D. Welty will discuss the trend in aircraft, Diesel and automobile engine design. Dr. Albert Sweinstein, Berlin, Germany, exchange professor at American universities, will also talk.

New York Steel Trade Has Had Very Little Improvement

Some Gain in Tin Plate Specifications—Sharp Reductions Announced on Steel Pipe by Large Makers

NEW YORK, April 4.—The most important occurrence in the local steel trade in the past week was the announcement of sharp reductions in prices of steel pipe by principal makers. This change was of unusual significance in New York, where pipe prices have recently been demoralized because of competition from a few small mills, some of which have been making truck deliveries to jobbers and to jobbers' customers. The cut in the base sizes of butt weld pipe is \$7 a ton, or from 67½ per cent to 71 per cent off list, but on some sizes the reductions amount to \$10 or more, an extreme case being large sizes of galvanized pipe, on which the new prices represent a drop of as much as \$33 a ton. Line pipe will be lowered \$10 to \$14 a ton. The reductions affect butt weld, lap weld and seamless pipe. Electric weld pipe will be reduced correspondingly.

There have been no other price developments. With the arrival of the new quarter, 2.60c., Pittsburgh, is a firm asking price on galvanized sheets, specifications against first quarter contracts having cleaned up the outstanding obligations at 2.50c. or less. Plate prices have not strengthened, usual quotations being 1.40c. to 1.50c., Coatesville, for small lots, with concessions still to be had on large lots.

The volume of business has improved in spots, but on the whole is not appreciably better. A few companies had larger sales in March than in February, but where such gains occurred, they were largely attributable to tin plate specifications, which for some makers have improved recently.

Structural steel contracts are featured by 10,500 tons placed with the McClintic-Marshall Corp. by James Stewart & Co., Inc., for the Federal Court House, New York. There are indefinite plans for a large arena on Long Island to take from 7000 to 15,000 tons of steel. The action of the Federal Government is holding up action on which contracts have not been awarded will delay work on about 40 projected public buildings.

Reinforcing Bars

Bids will be taken soon on 250 tons of mesh for a parking area at Jones Beach on Long Island. Awards in the past week included 650 tons for a viaduct and 175 tons for a bridge in New Jersey. Base quotations are unchanged. Competitive pressure of foreign bars has lifted perceptibly in re-

cent months. No shipments of imported bars were received here during January, according to a Department of Commerce report. Importations in January, 1932, amounted to 3819 tons. Bar imports into the United States in the latter half of last year decreased 75 per cent from the total for the first half.

Pig Iron

The American Radiator Co. is understood to have covered for its requirements for the remainder of 1933 for its plants at Bayonne, N. J.; Buffalo; Detroit; Springfield, Litchfield and Elyria, Ohio. This is the first sizable purchase that the company has made since it contracted last September for approximately 50,000 tons. Excluding the Radiator company business, bookings in the past week aggregated about 2500 tons, compared with 4500 tons in the preceding period and 2000 tons two weeks ago. Cur-

Boston Pig Iron Sales Largest in Months

BOSTON, April 4.—Close to 1500 tons of pig iron was sold here the past week, the largest total in months. Sales included one 300-ton and one 100-ton lot. A Worcester, Mass., melter has yet to cover on its 500-ton inquiry, and furnace representatives are negotiating privately with various foundries for several hundred tons. One furnace will accept orders for deliveries running into the third quarter. The lowest base price quoted on eastern Pennsylvania iron in New England the past week was \$13.50 a ton, furnace. A month or so ago one brand of Pennsylvania iron was offered at \$15.50 a ton, delivered. Prices on other domestic irons are firm, with the Mystic Iron Works generally quoting on a basis of \$16 a ton, furnace.

With a \$5.83 freight rate, No. 1 heavy melting steel at \$9.50 a ton, Pittsburgh, is still out of line with this market. At \$9.50 a ton, the f.o.b. shipping point price here would be \$3.67, whereas the best offers by brokers are \$3 to \$3.25. A moderate tonnage of cast engine blocks, structural shapes and chemical borings was moved the past week, but business in general continues on a small scale.

The cast iron pipe market is displaying a little more activity, but owing to the financial condition of most

rent open inquiry is meager, but several sizable lots are being tentatively figured. Eastern Pennsylvania No. 2 plain is definitely established at \$13.50, furnace, \$1 a ton higher than the previously published quotation. The Buffalo base price, while unchanged, is strong at \$14, furnace. Prospective opening of the New York State Barge Canal on or about April 15 will place Buffalo iron in a more competitive position in the metropolitan district. Foreign brands were more active during the past week, and, while quatably unchanged, reflect strength in concert with domestic prices.

Scrap

Slight improvement in domestic demand is perceptible. Requirements, however, are still inconsequential. Loading of No. 1 and No. 2 steel for export continues at unchanged prices. With value strengthening in other districts, brokers here are manifesting greater reluctance to assume further export commitments. It is intimated that, while foreign interests would be disposed to pay slightly higher prices for additional tonnages of steel scrap, their views do not match the firmer ideas of brokers, who are generally expectant that prices will soon move to higher levels.

towns and cities in New England the outlook for business is not encouraging. Prices for pipe are \$37 to \$37.50 a ton, delivered.

Pig Iron Prices Stronger at Cincinnati

CINCINNATI, April 4.—An advance in Northern pig iron prices has been announced and Southern quotations may also be advanced. The new quotations are uncertain as to the charge for silicon content, but it is understood that whatever practice develops in other districts will be followed here. The new Northern quotation figures about \$15.25 base at the furnace and is a substantial increase over quotations heretofore prevailing. Southern representatives have been instructed to watch for higher prices and not to quote the present \$10 Birmingham base without authority from the furnace.

Detroit Scrap Stronger; Steel Grades Advance

DETROIT, April 4.—Heavy melting steel has advanced 25c. a ton for the second consecutive week. Borings and turnings, No. 1 busheling and flashings have increased a like amount. Higher prices are due to the small amount of scrap coming into the market and to anticipation of higher mill operations.

Fabricated Structural Steel

Awards in Good Volume—New Projects Extremely Light

LETTINGS of 20,300 tons, the largest since the second week in February, were swelled by an award of 10,500 tons for a Federal court house in New York; a State viaduct at Newark, N. J., accounts for 3400 tons. Inquiries call for only 1450 tons; few new projects having been reported the past week. Awards follow:

NORTH ATLANTIC STATES

New York, 10,500 tons, Federal court house, to McClintic-Marshall Corp.; James Stewart & Co., Inc., New York, general contractor.

New York, 150 tons, bridge repairs, to McClintic-Marshall Corp.

Brooklyn, 145 tons, alterations, City Brewing Co. plant, to Belmont Iron Works.

Newark, N. J., 3400 tons, State highway viaduct, from George M. Brewster & Sons, general contractor, to American Bridge Co.

Buffalo, 200 tons, Lang's Brewery; bids taken April 3.

Baltimore, 2200 tons, United States Appraisers stores, to McClintic-Marshall Corp.

SOUTH AND SOUTHWEST

Dismal Swamp, Va., 175 tons, bascule bridges, to Virginia Bridge & Iron Co., Inc.

Columbus, Ga., 240 tons, post office, to Decatur Iron & Steel Co.

Slidell, La., 700 tons, bridge, to Wisconsin Bridge & Iron Co.

Hughes, Ark., 150 tons, highway bridge, to Pidgeon-Thomas Iron & Steel Co., Memphis.

CENTRAL STATES

Columbus, Ohio, 2830 tons, post office, to Wheeling Structural Steel Co. Previously reported to American Bridge Co.

Chicago, 100 tons, thermometer building at World's Fair for Indian Refining Co., to Hansell-Elcock Co.

Chicago, 100 tons, thermometer building at World's Fair, to Gage Structural Steel Co.

Clay County, Mo., 290 tons, State highway bridge, to Kansas City Structural Steel Co.

Livingston County, Mo., 100 tons, bridge, to Kansas City Structural Steel Co.

State of Missouri, 200 tons, bridges, divided among Mississippi Valley Structural Steel Co., Stupp Brothers Bridge & Iron Co., and Eagle Iron Works.

WESTERN STATES

Redlands, Cal., 100 tons, post office, to Consolidated Steel Corp.

San Francisco, 1500 tons, fender structure, Golden Gate bridge pier, to Moore Dry Dock Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

New York, 150 tons, repairs to Riverside Drive viaduct.

Long Island City, N. Y., 150 tons, grandstand.

Brooklyn, 340 tons, Jewish sanitarium.

Maplewood, N. J., 125 tons, addition to Marcus L. Ward home.

Philadelphia, 1000 tons, building for American Philosophical Society; bids April 8.

WESTERN STATES

Boulder, Nev., 400 tons, beams for Hoover dam.

San Francisco, 1500 tons, Yerba Buena Island crossing, San Francisco-Oakland bridge; Clinton Construction Co. low bidder.

San Francisco, 1280 tons, San Francisco anchorage for San Francisco-Oakland bridge; Healy-Tibbitts Construction Co. low bidder.

Nome, Alaska, 175 tons, Government project; bids under advisement.

Los Angeles, 100 tons, three sub-stations and 14 distributing stations for Metropolitan Water District; bids to be taken April 18.

FABRICATED PLATE

AWARDS

Swampscott, Mass., 100 tons, standpipe, to Chicago Bridge & Iron Works.

Texas City, Tex., 190 tons, oil tanks, to Wyatt Metal & Boiler Co., Houston.

NEW PROJECTS

Los Angeles, 4100 tons, aqueduct.

Reinforcing Steel

Awards 700 Tons—New Projects, 2700 Tons

Peoria, Ill., 100 tons, store and office building, to Kalman Steel Co.

Los Angeles County, Cal., 100 tons, bridge at Second Street over San Gabriel River, to Los Angeles Iron & Steel Co.

San Jose, Cal., 330 tons, post office, to Soule Steel Co.

San Diego, Cal., 163 tons, two State highway bridges, to an unnamed bidder.

Redlands, Cal., 100 tons, post office, to Consolidated Steel Corp.; previously reported to an unnamed bidder.

Los Angeles, Cal., 100 tons, city supplies, to McClintic-Marshall Corp.

NEW REINFORCING BAR PROJECTS

Boston, 235 tons, hospital kitchen.

Louisville, Ky., 1200 tons, sewer; Louisville Constructors, Inc., low bidder.

St. Louis, 900 tons, Federal building; bids opened April 4.

San Francisco, 2200 tons, Yerba Buena Island crossing, San Francisco-Oakland bridge, Clinton Construction Co. low bidder.

San Francisco, 1840 tons, San Francisco anchorage on San Francisco-Oakland bridge; Healy-Tibbitts Construction Co. low bidder.

San Quentin, Cal., 181 tons, State prison work, Pacific Coast Steel Corp. low bidder.

Hollywood, Cal., 200 tons, mausoleum.

Cast Iron Pipe

Boston has awarded 1250 tons to United States Pipe & Foundry Co.

Hartford, Conn., has closed bids on 5000 ft. of 12-in. class 150 pipe, and 229 tons of 12-in. pit cast.

Manchester, N. H., has closed bids on 400 tons.

Hartland, Wis., will require six miles of 4-, 6- and 8-in. pipe and a 60,000-gal. storage tank for a water system, for which a loan of \$40,000 has been secured from the Reconstruction Finance Corp.

Longview, Tex., has secured a loan of \$19,000 from the Reconstruction Finance Corp. for a sewage disposal plant and will purchase cast iron pipe, two Imhoff tanks and sludge pumping equipment.

Montgomery Water Corp., Mountain Trust Building, Roanoke, Va., plans purchase of about 8600 ft. of 6-in., and 2500 ft. of 8-in. for water service at Elliston, Va.

San Diego plans installation of cast iron pipe, from 8- to 30-in. diameter for extensions and improvements in water system. Fund of \$251,960 is being arranged for project.

Railroad Equipment

United States Navy Department is inquiring for five narrow-gage flat cars and three 30-ton box cars.

United Fruit Co. has ordered 42 15-ton fruit cars from Pullman Car & Mfg. Corp. for service on Santa Marta Railway, Colombia.

Pipe Lines

George E. Brimmer, Cheyenne, Wyo., and associates have secured permission for steel pipe line from oil field district near Maverick Springs to Bonneville, Wyo., and vicinity, about 33 miles. Cost over \$700,000.

Natural Gas Pipe Line of America, 20 North Wacker Drive, Chicago, has secured right-of-way for natural gas steel pipe line from Evans, Iowa, to Poweshiek County line, about six miles, and will begin work early in May. This will be a branch of a proposed steel pipe trunk line to Waterloo, Iowa, for which permission has been obtained.

Guymon, Okla., plans steel pipe line system in connection with new municipal gas plant. F. E. Devlin, W-K-H Building, Wichita, Kan., is consulting engineer.

Liquefied Natural Gas Corp., Fosbury Tower Building, Minneapolis, plans purchase of pipe and other materials for natural gas distributing system at Tracy, Westbrook, Currie, Minn., and vicinity.

Peter and A. J. Ellis, New York, submitted low bid for excavation for central heating plant, at Washington, requiring about 250 tons of steel pipe.

Buffalo Pig Iron Prices Firm as Inquiries Gain

BUFFALO, April 4.—Price firmness is apparent in the pig iron market. Inquiry is becoming more frequent, with several 100 to 300-ton lots appearing in the East and several 500-ton lots. A New York State inquiry is for 750 tons of foundry. Most of the inquiries are for second quarter, but some interest is apparent in third quarter delivery, with sellers endeavoring to confine their quotations to second quarter.

Steel

Bids went in on April 3 for a new brewery to require 200 tons of fabricated structural steel. Bethlehem Steel's Lackawanna plant is operating three open-hearth; Republic Steel is operating one, with a few turns on the bar mills scheduled for the week; Wickwire Spencer is operating one open-hearth, and Seneca sheet division of Bethlehem is operating at 20 per cent.

Scrap

The market is quiet and firm. There is no consumer buying of importance.

Tin Up Sharply on Brisk Demand and Favorable March Statistics

Zinc Strengthens as Ore Producers Curtail Drastically—
Copper, Lead Sluggish and Unchanged

NEW YORK, April 4.—Copper markets were bare of developments during the past week. Domestic consumers show little disposition to buy, while sellers display no eagerness to sell. Recent dealings have consequently been infrequent and for meager quantities. Electrolytic copper is unchanged at 5c. a lb., Connecticut, for delivery through June. The topic of curtailment is still imminent, but the only recent specific action in that direction was taken last week by the Nevada Consolidated Copper Co., which suspended operations at its Ray properties for an indefinite period. With domestic consumption manifesting no definite tendencies toward expansion, further suspensions, at least during the summer months, are considered probable.

Copper centers abroad were relatively quiet throughout the week. The Continental price, as a result, fluctuated narrowly, a few sales having

been reported at 4.95c. and 5c., c.i.f. usual European ports. Buying interest in the United Kingdom has diminished perceptibly, while a slight improvement in Germany has been reflected in more frequent sales. German copper markets, however, are still depressed by the unsettlement attending the Nazi boycotts. Far Eastern demand has tapered off somewhat.

Tin

An enlivened demand for prompt tin, coupled with favorable statistics for March, sponsored a 65-point rise for the week in the price of spot Straits at New York. Spot metal was quoted here today at 24.90c., but offerings were outnumbered by bids. A clear indication of the tight position of prompt tin is evidenced by postings of 24.65c. for May delivery. Buying through that month has been encouraging, and while it partly rep-

resents speculative covering, it also reflects gains in tin plate operations. That the current stringency respecting nearby metal will likely continue through April is foreshadowed by the fact that March shipments from the East exceeded the March quota, and a consequent adjustment of the over-shipment will proportionately restrict April shipments. While there was an actual increase of 393 tons in the total visible supply at the end of March, a decrease of 1281 tons in the Straits carryover resulted in a net decrease of about 900 tons in the visible stocks. Trading in London last week was at a normal pace. Values there again tended higher, with today's postings £152 a ton for spot standard, £153 for future standard, and £157 15s. for spot Straits. Today's Singapore market, at £158, reflected a relative gain for the week.

Lead

Demand for May lead has thus far been insignificant. Bookings last week were small and usually for spot delivery. Prices are evidently steady at 2.87½c., St. Louis, and 3c., New York. The closing down of the Herculean operations on April 1 is heralded as an important step toward adjusting the statistical position of the industry. With further curtailment among smaller producers likely to ensue during the summer months, the resultant well-balanced position of production and consumption is expected to offset any unsteadiness in the market situation that ordinarily would accompany summer retrenchment in consuming industries.

Zinc

Prime Western metal, after having dipped \$2 a ton early last week, rebounded to its former level of 3c., East St. Louis, or 3.37c., New York. The sole reason for the readjustment came from drastic curtailment of ore output in the Tri-State district, where large producers reached a tentative agreement to operate on the basis of a two-week month for an indeterminate period. Ore production in the current week is estimated at 1500 tons, compared with about 4000 tons a week ago. With this tense situation existing in the ore fields, sellers of metal are extremely cautious in quoting for forward delivery. Forward bookings are exceptionally small, and any slight increase in buying is expected to effect strength in prices. Sales last week totaled only 1100 tons, most of which represented imperative spot requirements of regular customers.

Copper Averages

The average price of Lake copper for March, based on daily quotations in THE IRON AGE, was 5.25c. a lb., delivered New York. The average price of electrolytic copper for that month was 5c., refinery, or 5.25c., delivered Connecticut.

The Week's Prices. Cents Per Pound for Early Delivery

	March 29	March 30	March 31	April 1	April 3	April 4
Electrolytic copper, N. Y.*	4.75	4.75	4.75	4.75	4.75	4.75
Lake copper, New York	5.00	5.00	5.00	5.00	5.00	5.00
Straits tin, Spot, N. Y.	24.40	24.50	24.45	24.70	24.70	24.90
Zinc, East St. Louis	2.90	2.90	2.95	3.00	3.00	3.00
Zinc, New York	3.27	3.27	3.32	3.37	3.37	3.37
Lead, St. Louis	2.87½	2.87½	2.87½	2.87½	2.87½	2.87½
Lead, New York	3.00	3.00	3.00	3.00	3.00	3.00

*Refinery quotations price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.

Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.

Antimony, 5.80c. a lb., New York.

Brass ingots, 85-5-5-5, 5.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	26.00c. to 27.00c.
Tin, bar	28.00c. to 30.00c.
Copper, Lake	7.00c. to 8.00c.
Copper, electrolytic	6.75c. to 7.75c.
Copper, casting	6.50c. to 7.50c.
*Copper sheets, hot-rolled	13.87½c.
*High brass sheets	11.25c.
*Seamless brass tubes	13.50c.
*Seamless copper tubes	12.62½c.
*Brass rods	8.75c.
Zinc, slabs	4.37½c. to 4.87½c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	3.75c. to 4.25c.
Lead, bar	5.25c. to 6.25c.
Lead, sheets	7.00c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	16.00c.
Solder, ½ and ½	15.50c. to 16.50c.
Babbitt metal, commercial grade	21.00c. to 32.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	28.50c.
Tin, bar	30.50c.

Copper, Lake	6.00c.
Copper, electrolytic	6.00c.
Copper, casting	5.75c.
Zinc, slab	4.25c. to 4.50c.
Lead, American pig	4.00c. to 4.50c.
Lead, bar	7.50c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	16.50c.
Babbitt metal, high grade	32.25c.
Solder, ½ and ½	17.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	3.75c.	4.25c.
Copper, hvy. and wire	3.625c.	4.125c.
Copper, light and bottoms	2.75c.	3.50c.
Brass, heavy	1.625c.	2.25c.
Brass, light	1.375c.	1.75c.
Hvy. machine composition	2.625c.	3.00c.
No. 1 yel. brass turnings	2.125c.	2.50c.
No. 1 red brass or compos. turnings	2.375c.	2.75c.
Lead, heavy	2.125c.	2.50c.
Zinc	1.25c.	1.625c.
Cast aluminum	3.75c.	5.00c.
Sheet aluminum	8.50c.	10.00c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	Base per Lb.
Fab. Pittsburgh mill	1.90c
Fab. Chicago	1.90c
Del'd Philadelphia	1.70c
Del'd New York	1.91c
Del'd Detroit	1.95c
Fab. Cleveland	1.85c
Fab. Lackawanna	1.85c
Fab. Birmingham	1.70c
C.I.F. Pacific ports	1.75c
	2.10c

Billet Steel Reinforcing

(as quoted by distributors)

Fab. P'gh mills, 40, 50, 60-ft.	1.40c
Fab. Birmingham, mill lengths	1.65c
Fab. Cleveland	1.60c

Roll Steel

Fab. mills, east of Chicago dist.	1.80c
Fab. Chicago Heights mills	1.50c

Iron

Common iron, f.o.b. Chicago	1.60c
Refined iron, f.o.b. P'gh mills	1.75c
Common iron, del'd Philadelphia	1.85c
Common iron, del'd New York	1.90c

Tank Plates

Fab. Pittsburgh mill	Base per Lb.
Fab. Chicago	1.60c.
Fab. Birmingham	1.70c.
Del'd Cleveland	1.75c.
Del'd Philadelphia	1.8035c.
Fab. Coatesville	1.4935c. to 1.5935c.
Fab. Sparrows Point	1.40c. to 1.50c.
Del'd New York	1.40c. to 1.50c.
C.I.F. Pacific ports	1.598c. to 1.698c.
Wrought iron plates, f.o.b. P'gh	2.00c.
	3.00c.

Structural Shapes

	Base per Lb.
Fab. Pittsburgh mill	1.60c
Fab. Chicago	1.60c
Fab. Birmingham	1.70c
Fab. Lackawanna	1.75c
Fab. Bethlehem	1.70c
Del'd Cleveland	1.70c
Del'd Philadelphia	1.8035c
Del'd New York	1.7495c
G.I.F. Pacific ports (standard)	1.80775c
G.I.F. Pacific ports	2.10c
G.I.F. Pacific ports (wide flange)	2.25c

Steel Sheet Piling

	Base per Lb.
Fab. Pittsburgh	1.90c.
Fab. Chicago mill	2.05c.
Fab. Buffalo	2.00c.

Alloy Steel Bars

(Fab. Pittsburgh, Chicago, Buffalo, Massillon or Canton)	
Alloy Quantity Bar Base, 1.45c to 2.65c per Lb.	

S.A.R. Series	Alloy Differential per 100 Lb.
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2000 (1/4% Nickel)	0.25
3100 (1/4% Nickel)	0.25
3500 (3/4% Nickel)	0.25
3500 (5% Nickel)	1.50
3100 Nickel Chromium	2.35
3200 Nickel Chromium	0.55
3300 Nickel Chromium	1.35
3400 Nickel Chromium	2.80
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4000 Nickel Molybdenum (0.20 to 0.30 Nickel)	0.70
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Spring Steel	0.45
4100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
5200 Silicon Manganese Spring	0.25
Chromium Nickel Vanadium	0.50
Carbon Vanadium	1.50

Forging quality. The differential for cold-drawn bars is 1/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.	
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Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.	
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Cold Finished Bars*

Bars, f.o.b. Pittsburgh mill	1.70c
Bars, f.o.b. Chicago	1.75c
Bars, Cleveland	1.75c
Bars, Buffalo	1.75c
Bars, Detroit	1.75c
Bars, eastern Michigan	1.90c
Shafting, ground, f.o.b. mill	1.95c

1-3/16 to 1 1/2 in. 3.00c	
1-9/16 to 1 1/2 in. 2.50c	
1-15/16 to 1 1/2 in. 2.35c	
2-1/16 to 1 1/2 in. 2.20c	
2-15/16 to 1 1/2 in. 2.05c	

* In quantities of 10,000 to 10,999 lb.	
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SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.40c
No. 10, f.o.b. Chicago mill	1.50c
No. 10, del'd Philadelphia	1.50c
No. 10, f.o.b. Birmingham	1.71c
No. 10, c.i.f. Pacific Coast ports	2.02c

Hot-Rolled Annealed

No. 10, Pittsburgh	1.55c
No. 10, Chicago mills	1.65c
No. 10, Birmingham	1.70c
No. 10, Pacific Coast ports	2.17c
No. 10, wrought iron, Pittsburgh	2.60c

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.00c
No. 24, f.o.b. Chicago mills	2.10c
No. 24, del'd Philadelphia	2.10c
No. 24, f.o.b. Birmingham	2.15c
No. 24, c.i.f. Pacific Coast ports	2.65c
No. 24, wrought iron, Pittsburgh	4.30c

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	1.90c
No. 10 gage, f.o.b. Chicago mills	2.00c
No. 10 gage, del'd Philadelphia	2.21c
No. 10 gage, del'd Pacific Coast ports	2.52c

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.30c
No. 20 gage, f.o.b. Chicago mills	2.40c
No. 20 gage, del'd Philadelphia	2.61c
No. 20 gage, del'd Pacific Coast ports	2.95c

Note: Automobile body stock and steel furniture sheets to be quoted henceforth on cold-rolled sheet base prices, with extras for drawing quality.

Galvanized Sheets

No. 24 f.o.b. Pittsburgh	2.60c
No. 24 f.o.b. Chicago mills	2.70c
No. 24, del'd Philadelphia	2.91c
No. 24 f.o.b. Birmingham	2.75c
No. 24 c.i.f. Pacific Coast ports	3.25c
No. 24, wrought iron, Pittsburgh	4.95c

Long Terns

No. 24, unannealed, 8-lb. coating, f.o.b. Pittsburgh	2.75c
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Vitreous Enameling Steel

No. 10, f.o.b. Pittsburgh	2.40c to 2.50c
No. 20, f.o.b. Pittsburgh	2.90c to 3.00c

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.30c
No. 28, Chicago mill	2.40c

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	
Standard cokes, f.o.b. Gary	\$4.25
	4.35

Terne Plate

(P.O.B. Morgantown or Pittsburgh) (Per Package, 20 x 28 in.)

8-lb. coating I.C.	\$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Plates under 1/4 in.

Base per Lb.	
All widths up to 24 in., Pittsburgh	1.45c.
All widths up to 24 in., Chicago	1.55c.
Cooperage stock, P'gh	1.55c. to 1.60c.
Cooperage stock, Chicago	1.65c. to 1.70c.

Cold-Rolled Strips

Fab. Pittsburgh	1.80c to 2.00c
Fab. Cleveland	1.80c to 2.00c
Del'd Chicago	2.20c to 2.30c
Fab. Worcester	2.00c to 2.10c
Fonder stock, No. 20 gage, Pittsburgh or Cleveland	2.55c to 2.65c

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

Extras of 10c. a 100 lb. on mixed and joint carloads. 20c. on pool carloads and 30c. on less than carloads are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

To Manufacturing Trade

Bright wire	2.10c
Spring wire	3.10c

To Jobbing Trade

Standard wire nails	Base per Keg
Smooth coated nails	\$1.85
Galvanized nails	1.85
	2.25
Smooth annealed wire	Base per 100 Lb.
Smooth galvanized wire	\$2.25
Polished staples	2.60
Galvanized staples	2.55
Barbed wire, galvanized	2.50
	2.25

Woven wire fence No. 9 gage, base column, per net ton.....\$50.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel	Black Galv.	Wrought Iron
1/4 to 3/8	55	33	44
3/8 to 1/2	60 1/2	42	48 1/2
1/2 to 3/4	65 1/2	54	53 1/2
3/4 to 1	69	59	57 1/2
1 to 3	71	62	59 1/2

Lap Weld

Inches	Steel	Black Galv.	Wrought Iron
2 to 6	66	57	62
6 to 8	69 1/2	60 1/2	65 1/2
8 to 10	68	58	64
10 and 12	67	57	63
11 and 12	66	56	62

Butt Weld, extra strong, plain ends	Black Galv.	Wrought Iron
1/4 to 3/8	52	37
3/8 to 1/2	58	43
1/2 to 3/4	63 1/2	54 1/2
3/4 to 1	68	59
1 to 3	70	62

Lap Weld, extra strong, plain ends	Black Galv.	Wrought Iron
2 to 6	65	57
6 to 8	69	61
8 to 10	68	58
10 and 12	67	57
11 and 12	66	56

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2 1/2	1 1/2 in. 1
3 in. 33	2 in. 8
3 1/2 in. 46	2 1/2 in. 13
4 in. 52	3 in. 16
4 1/2 in. 54	3 1/2 in. 17
5 in. 56	4 in. 18
5 1/2 in. 57	4 1/2 in. 20
6 in. 58	5 in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two five on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn	Hot Rolled
1 in. 61	3 in. 46
1 1/4 to 1 1/2 in. 53	3 1/2 to 4 in. 48
1 1/2 in. 57	4 in. 51
2 to 2 1/2 in. 32	4 1/2, 5 and 6 in. 40
2 1/2 to 3 in. 40	

Beyond the above base discounts a preferential discount of 5 per cent is allowed on 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 34 ft. Sizes smaller than 1 in. in lighter than standard discounts. Intermediate sizes and larger side diameter and heavier gage.

Seamless Mechanical Tubing

Carbon, 0.10% to 0.30% base (carloads) 55
Carbon, 0.30% to 0.40% base 50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warrents discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

Per Gross Ton
Standard, f.o.b. mill.....\$40.00
Light (from billets), f.o.b. mill.....30.00
Light (from rail steel, f.o.b. mill).....20.00

Track Equipment

Base per 100 Lb.
Spikes, 9/16 in. and larger.....2.15
Spikes, 1/2 in. and larger.....2.30
Spikes, boat and barge.....1.75
Tie plates, steel.....2.55
Angle bars.....3.50
Track bolts, to steam railroads.....3.50
Track bolts, in jobbers, all sizes, per 100 count.....73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List
Machine bolts.....75
Carriage bolts.....75
Lag bolts.....75
Flow bolts, Nos. 1, 2, 3 and 7 heads.....75
Hot-pressed nuts, blank or tapped, square.....75
Hot-pressed nuts, blank or tapped, hexagonal.....75
C.p.c. and t. square or hex nuts, blank or tapped.....75
*F.o.b. Chicago, New York and Pittsburgh.....75

Bolts and Nuts

Per Cent Off List
Semi-finished hexagon nuts.....75
Semi-finished hexagon castellated nuts, S.A.E.....75
Store bolts in packages, P'gh.....75, 25 and 10
Store bolts in packages, Chicago.....75, 25 and 10
Store bolts in pkgs., Cleveland.....75, 25 and 10
Store bolts in bulk, P'gh.....84
Store bolts in bulk, Chicago.....86
Store bolts in bulk, Cleveland.....86
Tire bolts.....80 and 10
Discounts of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

(1/2 in. and larger)

Base per Lb.
Fab. Pittsburgh or Cleveland.....\$2.25
Fab. Chicago.....2.35

Small Rivets

(7/16 in. and smaller)

Per Cent Off List
F.o.b. Pittsburgh.....70, 10 and 10
F.o.b. Cleveland.....70, 10 and 10
F.o.b. Chicago.....70, 10 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 45c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List
Milled cap screws, 1 in. dia. and smaller.....85
Milled standard set screws, case hardened, 1 in. dia. and smaller.....85
Milled headless set screws, cut thread 1/4 in. and smaller.....75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller.....85 and 10 to 25, 10 and 10
Upset set screws, sq. head, 30 to 80 and 10
Milled studs.....70

SEMI-FINISHED STEEL

Billets and Blooms

Per Gross Ton
Rolling, 4-in. to 6-in., inclusive, Pittsburgh.....\$28.00
Rolling, 4-in. to 6-in., inclusive, Youngstown.....26.00
Rolling, 4-in. to 6-in., inclusive, Cleveland.....26.00
Rolling, 4-in. to 6-in., inclusive, Chicago.....26.00
Forging quality, Pittsburgh.....31.00
Forging quality, Youngstown.....31.00

Sheet Bars

(Open-Hearth or Bessemer)

Per Gross Ton
Pittsburgh.....\$28.00
Youngstown.....26.00
Cleveland.....26.00

Slabs

Per Gross Ton
(3 in. x 2 in. and under 10 in. x 10 in.)
Pittsburgh.....\$28.00
Youngstown.....26.00
Cleveland.....26.00
(Turn to next page)

Skeip	
(F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grounded	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods	
(Common soft, base)	
	Per Gross Ton
Pittsburgh	\$35.00
Cleveland	\$35.00
Chicago	\$36.00

COKE, COAL AND FUEL OIL

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville	\$1.75 to \$2.00
Prompt Foundry, f.o.b. Connellsville	2.50 to 4.00
Foundry, by-product, Chicago	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.30 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.00 to \$1.15
Mine run coking coal, f.o.b. W. Pa.	1.10 to 1.25
Gas coal, %-in., f.o.b. Pa. mines	1.35 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.30
Steam slack, f.o.b. W. Pa. mines	0.35 to 0.35
Gas slack, f.o.b. W. Pa. mines	0.35 to 0.45

Fuel Oil	
	Per Gal. f.o.b. Bayonne, N. J.
No. 2 distillate	4.00c.
No. 4 industrial	3.50c.
	Per Gal. f.o.b. Baltimore
No. 2 distillate	4.00c.
No. 4 industrial	3.50c.
	Per Gal. del'd Chicago
No. 2 industrial fuel oil	3.25c.
No. 5 industrial fuel oil	2.65c. to 2.75c.
	Per Gal. f.o.b. Cleveland
No. 2 distillate	5.25c.
No. 4 industrial	4.75c.

REFRACTORIES

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-heat Intermediate Duty Brick	\$35.00 to \$30.00
Penn.	35.00 25.00 to 30.00
Maryland	37.00 25.00 to 30.00
New Jer.	\$44.00 to 35.00 25.00 to 30.00
Ohio	35.00 25.00 to 30.00
Kentucky	35.00 25.00 to 30.00
Missouri	35.00 25.00 to 30.00
Illinois	35.00 25.00 to 30.00
Ground fire clay, per ton	6.50

Chrome Brick	
	Per Net Ton
Standard size	\$42.50

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick	
	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	\$61.50
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.90

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	\$41.40
4-in., del'd Chicago	44.40
6-in., and larger, del'd New York	35.30
4-in., del'd New York	38.30
6-in., and larger, Birm'ham	35.00
4-in., Birmingham	36.00

Class "A" and gas pipe, \$3 extra.

VALLEY

Per Gross ton, f.o.b. Valley furnace:	
Basic	\$13.50
Bessemer	15.00
Gray Forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	14.50
Low phos., copper free	23.00

Freight rate to Pittsburgh or Cleveland district, \$1.80.

PITTSBURGH

Per Gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$14.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.00

Freight rates to points in Pittsburgh district range from 69c. to \$1.26.

CHICAGO

Per gross ton at Chicago furnaces:	
N'th'n No. 2 fdy.	\$15.50
N'th'n No. 1 fdy.	16.00
Malleable, not over 2.25 sil.	15.50
High phosphorus	15.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	16.14
Low phos., sil. 1 to 2, Copper free	25.00
Silvery, sil. 8 per cent.	23.67
Best, ferro-sil., 15 per cent.	23.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

St. LOUIS

Per gross ton at St. Louis:	
No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
Northern No. 2 fdy., del'd St. Louis	17.80
Northern malleable, del'd	17.80
Northern basic, del'd	17.80

Freight rates 83c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:	
No. 2 fdy., No. 2, del'd east	\$17.41 to \$17.66
East Pa. No. 2 fdy.	15.02
East Pa. No. 2X fdy.	15.27

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania. Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:	
No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

CINCINNATI

Per gross ton, delivered Cincinnati:	
Ala. fdy., sil. 1.75 to 2.25	\$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	\$17.01 to 17.59
S'th'n No. 2 silvery, 8%	21.02

Freight rates, \$2.02 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:	
N'th'n No. 2 fdy. (local delivery)	\$15.00
S'th'n fdy., sil. 1.75 to 2.35	16.14
Basic (local delivery)	15.00
Ohio silvery, 8 per cent.	21.87
Stand. low phos., Valley	23.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 63c. average local switching charge; \$3.12 from Jackson, Ohio; \$5.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:	
East Pa. No. 2	\$14.34
East Pa. No. 2X	14.59
East Pa. No. 1X	14.84
Basic (del'd east, Pa.)	14.00
Malleable	15.34
Stand. low phos. (f.o.b. east, Pa. furnace)	20.00 to 21.00
Cop. b'r'g low phos. (f.o.b. furnace)	20.00 to 21.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: 84c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

Pig Iron, Ores, Ferroalloys

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:	
No. 2 fdy., 1.75 to 2.25 sil.	\$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

NEW ENGLAND

Per gross ton delivered to most New England points:	
*Buffalo, sil. 1.75 to 2.25	\$19.05
*Buffalo, sil. 2.25 to 2.75	19.05
*Buffalo, sil. 1.75 to 2.25	18.03
*Buffalo, sil. 2.25 to 2.75	18.03
*Ala., sil. 1.75 to 2.25	15.64
*Ala., sil. 2.25 to 2.75	16.14

Freight rates: \$5.05 all rail from Buffalo, and \$3.66 to \$4.03 rail and water from Buffalo when \$1.25 barge and \$2.13 to New England freight rate are obtainable; \$5.64 rail and water from Alabama to New England seaboard.

* All-rail rate.

† Rail-and-water rate.

CANADA

Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.75	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$25.00 to 23.50

Ferromanganese

Per Gross Ton	
Domestic, 80%, seaboard	\$28.00
Foreign, 80%, Atlantic or Gulf port, duty paid	61.00

*Contract price; spot quotation \$61. Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen

Per Gross Ton Furnace	
Domestic, 19 to 21%	\$24.00

Electric Ferrosilicon

Per Gross Ton Delivered	
50% (carloads)	\$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b. Welland, Ont. (in carloads)	81.00
14% to 16% (less carloads)	86.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace	
Per Gross Ton	Per Gross Ton
11%	\$20.50
14%	22.50
16%	24.00
18%	25.00
19%	26.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace	
Per Gross Ton	Per Gross Ton
8%	\$18.00
7%	18.50
6%	18.75
5%	19.00
4%	19.50
3%	20.00
2%	20.00
1%	20.00

Other Ferroalloys

Ferrotungsten, per lb. w.o. del. carloads	\$4c.
Ferrotungsten, less carloads	\$1.00

Ferromanganese, 4 to 5% carbon and up to 70% Cr., per lb. contained Cr. delivered, in carloads 0.30c.

Ferromanganese, 2% carbon 16.50c. to 17.00c.

Ferromanganese, 1% carbon 17.50c. to 18.00c.

Ferromanganese, 0.10% carbon 19.50c. to 20.00c.

Ferromanganese, 0.06% carbon 20.00c. to 20.50c.

Ferromanganese, del. per lb. contained Va. \$3.00 to \$3.00

Ferromanganese, 15 to 18%, per net ton, f.o.b. furnace in carloads 100.00

Ferromanganese, electric, or blast furnace material, in carloads, 18% Rockdale, Tenn., base, per gross ton with \$2 unitage 50.00

Ferromanganese, electric, 24% f.o.b. Anniston, Ala., per gross ton with \$2.75 unitage 65.00

Ferromolybdenum, per lb. Mo., del. 80c.

Calcium molybdate, per lb. Mo., del. 80c.

Silico spiegel, per ton, f.o.b. furnace, car lots \$25.00

Ton lots or less, per ton 41.00

Silico-manganese, gross ton, delivered: 2.50% carbon grade 85.00

8% carbon grade 90.00

1% carbon grade 100.00

Spot prices \$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton	
Old range Bessemer, 51.5% iron	\$4.50
Old range, non-Bessemer, 51.50% iron	4.60
Mesabi Bessemer, 51.50% iron	4.60
Mesabi non-Bessemer, 51.50% iron	4.60
High phosphorus, 51.50% iron	4.60
Foreign Ore, c.i.f. Philadelphia or Baltimore	

Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian 8c. to 8.50c.

Iron, low phos., Swedish, average 68% iron 8c.

Iron, basic or foundry, Swedish, average, 65% iron 8c.

Iron, basic or foundry, Russian, aver. 63% iron (nom.) 8c.

Manganese, Caucasian, washed 92% 21c. to 22c.

Manganese, African, Indian, 50-52% 21c. to 22c.

Manganese, Brazilian, 48 to 49% 21c. to 22c.

Tungsten, Chinese wolframite, duty paid \$10.00

Tungsten, domestic scheelite \$9.00 to \$10.00

Chrome, 45%, Cr₂O₃, crude, c.i.f. Atlantic seaboard 14.00

Chrome, 48%, Cr₂O₃, c.i.f. Atlantic seaboard 15.00

*Quotations nominal in absence of sales.

Fluorspar

Per Net Ton	
Domestic, washed gravel 85-5, f.o.b. Kentucky and Illinois mines	\$9.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	\$11.00 to 11.90
Foreign, 85% calcium fluoride, not over 1% silicon, c.i.f. Atlantic port, duty paid	\$16.00 to 16.75
Domestic, No. 1 ground bulk, 83 to 98% calcium fluoride, not over 2% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.00 to \$9.50
No. 2 heavy melting steel	7.50 to 8.00
No. 2 railroad wrought	9.00 to 9.50
Scrap rails	9.00 to 9.50
Rails 3 ft. and under	10.00 to 10.50
Sheet bar crops, ordinary	9.50 to 10.00
Compressed sheet steel	8.75 to 9.25
Hand bundled sheet steel	7.50 to 8.00
Hvy. steel axle turnings	7.00 to 7.50
Machine shop turnings	6.50 to 7.00
Short shov. steel turnings	6.25 to 6.75
Short mixed borings and turnings	5.50 to 6.00
Cast iron borings	5.50 to 6.00
Cast iron car wheels	8.00 to 8.50
Heavy breakable cast	8.00 to 8.50
No. 1 cast	8.50 to 9.00
Rail, knuckles and couplers	10.00 to 10.50
Rail, coil and leaf springs	10.00 to 10.50
Roller sheet wheels	10.00 to 10.50
Low phos. billet crops	10.50 to 11.00
Low phos. sheet bar crops	10.50 to 11.00
Low phos. plate scrap	9.50 to 10.00
Low phos. punchings	10.00 to 10.50
Steel car axles	10.00 to 10.50

CHICAGO

Delivered Chicago district consumers:	
	Per Gross Ton
Heavy melting steel	\$8.00 to \$8.50
Shoveling steel	5.00 to 5.50

Hydraulic comp. sheets	4.00 to 4.50
Drop forge flashings	4.00 to 4.50
No. 1 busheling	4.00 to 4.50
Roller car wheels	7.00 to 7.50
Railroad tires	8.00 to 8.50
Railroad leaf springs	7.75 to 8.25
Axle turnings	4.50 to 5.00
Steel couplers and knuckles	6.00 to 6.50
Coil springs	8.25 to 8.75
Axle turnings (elec. fur.)	8.50 to 9.00

No. 2 busheling	\$2.00 to \$2.50
Locomotive tires, smooth	7.50 to 8.50
Pipe and flues	1.25 to 1.75
No. 1 machinery cast	6.75 to 7.25
Clean automobile cast	7.25 to 7.75
No. 1 railroad cast	6.00 to 6.50
No. 1 agricultural cast	5.75 to 6.25
Store plate	5.50 to 6.00
Grate bars	6.25 to 6.75
Brake shoes	6.00 to 6.50

Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$6.50 to \$7.00
No. 2 heavy melting steel	5.00 to 5.50
No. 1 railroad wrought	7.50 to 8.00
Bundled sheets	4.00 to 4.50
Hydraulic compressed, new	5.50 to 6.00
Hydraulic compressed, old	4.00 to 4.50
Machine shop turnings	3.50 to 4.00
Heavy axle turnings	5.50 to 6.00
Cast borings	3.50 to 3.75
Heavy breakable cast	8.50
Store plate (steel works)	5.50 to 6.00
No. 1 low phos. heavy	10.00 to 10.50
Couplers and knuckles	8.50 to 9.00
Rolled steel wheels	8.50 to 9.00
No. 1 blast furnace	3.50 to 3.75
Spec. iron and steel pipe	6.50 to 7.00
Shafting	12.00 to 13.00
Steel axles	12.00 to 13.00
No. 1 forge fire	5.50 to 6.00
Cast iron car wheels	8.50
No. 1 cast	8.00 to 9.00
Cast borings (chem.)	8.00 to 10.00
Steel rails for rolling	9.00 to 9.50

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$7.00 to \$7.25
No. 2 heavy melting steel	6.25 to 6.50
Compressed steel	6.00 to 6.50
Light bundled sheet stampings	4.00 to 4.50
Drop forge flashings	5.25 to 5.75
Machine shop turnings	3.50 to 3.75
Short shoveling turnings	3.75 to 4.25
No. 1 busheling	5.25 to 5.50
Steel axle turnings	5.00 to 5.50
Low phos. billet crops	10.00 to 11.00
Cast iron borings	4.50 to 5.00
Mixed borings and short turnings	4.50 to 5.00
No. 2 busheling	4.50 to 4.75
No. 1 cast	7.00 to 7.50
Railroad grate bars	5.00 to 5.50
Store plate	3.00 to 3.50
Balls under 3 ft.	8.50 to 9.00
Rails for rolling	8.50 to 9.00
Railroad malleable	6.75 to 7.00
Cast iron car wheels	8.00

BUFFALO

Per gross ton, f.a.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$7.00 to \$7.25
No. 2 heavy melting steel	6.00 to 6.50
Scrap rails	6.00 to 6.50
New hydraulic comp. sheets	5.50 to 6.00
Old hydraulic comp. sheets	5.00
Drop forge flashings	5.50 to 6.00
No. 1 busheling	5.50 to 6.00
Hy. steel axle turnings	10.00 to 11.00
Machine shop turnings	4.00 to 4.50
Knuckles and couplers	9.00
Coil and leaf springs	9.00
Rolled steel wheels	9.00
Low phos. billet crops	9.00 to 9.50
Short shoveling turnings	5.50 to 6.00
Short mixed borings and turnings	3.75 to 4.25
Cast iron borings	3.75 to 4.25
No. 2 busheling	3.50 to 4.00
Steel car axles	10.00 to 11.00
Iron axles	10.00 to 11.00
No. 1 machinery cast	9.50 to 10.00
No. 1 cupola cast	8.50 to 9.00
Store plate	7.00 to 7.50
Steel rails, 3 ft. and under	8.50 to 9.00
Cast iron car wheels	8.00 to 9.00
Industrial malleable	7.00 to 7.50
Railroad malleable	7.00 to 7.50
Chemical borings	7.50 to 8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$7.00 to \$7.50
Scrap steel rails	7.00 to 7.50
Short shoveling turnings	4.00
Store plate	6.00
Steel axles	9.00
Iron axles	9.00
No. 1 railroad wrought	7.50 to 8.00
Rails for rolling	7.50 to 8.00
No. 1 cast	8.50
Tramcar wheels	8.00
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$5.50 to \$6.00
No. 1 heavy melting	5.25 to 5.50
No. 2 heavy melting	4.75 to 5.25
No. 1 locomotive tires	5.00 to 5.50
Misc. stand-sec. rails	5.50 to 6.00
Railroad springs	6.00 to 6.50
Bundled sheets	2.00 to 2.50
No. 2 railroad wrought	5.00 to 5.50
No. 1 busheling	3.50 to 4.00
Cast iron borings and shoveling turnings	1.25 to 1.75
Rails for rolling	1.25 to 1.75
Machine shop turnings	1.25 to 1.75
Heavy turnings	3.00 to 3.50
Steel car axles	8.50 to 9.00
Iron car axles	11.00 to 11.50
Wrot. iron bars and trans.	4.00 to 4.50
No. 1 railroad wrought	5.50 to 6.00
Steel rails less than 3 ft.	7.50 to 8.00
Steel angle bars	6.00 to 6.50
Cast iron car wheels	5.50 to 6.00
No. 1 machinery cast	7.00 to 7.50
Railroad malleable	4.00 to 4.50
No. 1 railroad cast	6.25 to 6.75
Store plate	6.00 to 6.50
Relay rails, 60 lb. and under	16.00 to 16.50

Relay rails, 60 lb. and over \$20.00 to \$21.00
Agricult. malleable 4.00 to 4.50

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$3.00 to \$3.25
Scrap T rails	2.50 to 2.75
Machine shop turnings	0.80 to 1.00
Cast iron borings	1.05
Bundled skeleton, long	2.00 to 2.10
Forge flashings	3.00 to 3.50
Blast furnace scrap	0.90 to 1.00
Forge scrap	3.00 to 3.25
Shafting	9.50 to 10.00
Steel car axles	9.00 to 9.50
Store plate	4.00 to 4.50
Rails for rolling	4.50 to 5.00
Cast iron borings, chemical	7.00 to 7.25
Per gross ton delivered consumers' yards:	
Textile cast	\$7.00 to \$7.50
No. 1 machinery cast	7.50 to 8.00
Store plate	5.00 to 5.25
Railroad malleable	8.00 to 8.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$3.50 to \$5.00
No. 2 heavy melting steel	3.50 to 4.00
Heavy melting steel (yard)	1.50
No. 1 heavy breakable cast	5.00 to 5.25
Store plate (steel works)	2.50 to 2.90
Machine shop turnings	0.75 to 1.25
Short shoveling turnings	0.75 to 1.25
Cast borings	0.50 to 1.00
No. 1 blast furnace	0.50 to 1.00
Steel car axles	8.00 to 8.50

PITTSBURGH

Base per Lb.	
Plates	2.85c
Structural shapes	2.85c
Soft steel bars and small shapes	2.60c
Reinforcing steel bars	2.60c
Cold-finished and screw stock	2.60c
Rounds and hexagons	2.95c
Squares and flats	2.95c
Hoops and bands, under 1/4 in.	2.95c
Hot-rolled annealed sheets (No. 24)	3.10c
Galv. sheets (No. 24), 25 or more bundles	3.35c
Hot-rolled sheets (No. 10)	2.65c
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	\$3.61
Spikes, large	2.40c
Small	2.65c
Boat	2.90c
Track bolts, all sizes, per 100 count	70 per cent off list
Machine bolts, 100 count	70 per cent off list
Carriage bolts, 100 count	70 per cent off list
Nuts, all styles, 100 count	70 per cent off list
Large rivets, base per 100 lb.	\$3.00
Wire black soft ann'd, base per 100 lb.	2.65
Wire, galv. soft, base per 100 lb.	3.10
Common wire nails, per keg	2.20
Cement coated nails, per keg	2.20
On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.	

CHICAGO

Base per Lb.	
Plates and structural shapes	3.00c
Soft steel bars	2.75c
Reinforce. bars, billet steel	1.70c
Rail steel reinforcement	1.30c to 1.45c
Cold-fin. steel bars and shafting	3.00c
Rounds and hexagons	3.00c
Flats and squares	2.95c
Bands, 3/16 in. (in Nos. 10 and 12 gauge)	2.95c
Hoops (No. 14 gauge and lighter)	3.50c
Hot-rolled annealed sheets (No. 24)	3.45c
Galv. sheets (No. 24)	3.50c
Hot-rolled sheets (No. 10)	3.20c
Spikes (3/16 in. and lighter)	3.30c
Track bolts	4.30c
Rivets, structural (keg lots)	2.75c
Rivets, boiler (keg lots)	2.75c
Per Cent Off List	
Machine bolts	65
Carriage bolts	65
Coad and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	60 and 10
Spring cotter	80
Store bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	\$4.50 off list
No. 8 black ann'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg	2.30
Cement c'd nails, base per keg	2.30

NEW YORK

Base per Lb.	
Plates and struc. shapes	3.10c
Soft steel bars, small shapes	3.10c
Iron bars	3.24c
Iron bars, Swed. charcoal	5.90c to 6.25c
Cold-fin. shafting and screw stock	3.54c
Rounds and hexagons	4.04c
Flats and squares	4.04c
Cold-roll. strip, soft and quarter hard	4.95c
Hoops	3.30c
Bands	3.30c
Hot-rolled sheets (No. 10)	2.75c
Hot-rolled ann'd sheets (No. 24)	3.25c
Galvanized sheets (No. 24)	3.50c
Long term sheets (No. 24)	4.50c
Standard tool steel	12.00c
Wire, black annealed (No. 10)	3.60c
Wire, galv. annealed (No. 10)	4.05c
Tire steel 1/2 x 1/4 in. and larger	3.40c
Smooth finish, 1 to 2 1/2 x 1/4 in. and larger	3.75c

Spec. iron and steel pipe	\$2.50 to \$2.75
Forge fire	2.75 to 3.00
No. 1 railroad wrought	4.00 to 4.50
No. 1 yard wrought long	3.25 to 3.50
Rails for rolling	5.00 to 5.50
No. 1 cast	4.50
No. 2 cast	4.50
Store plate (foundry)	4.50
Malleable cast (railroad)	4.00 to 4.50
Cast borings (chemical)	5.00 to 5.50
Per gross ton delivered local foundries	\$9.00
No. 1 machinery cast	7.50 to 8.00
No. 1 hvy. cast (cupola size)	7.50 to 8.00
No. 2 cast	4.00 to 4.50

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$5.25 to \$5.75
Scrap rails for melting	6.00 to 6.50
Loose sheet clippings	1.00 to 1.50
Bundled sheets	3.75 to 4.25
Cast iron borings	3.00 to 3.50
Machine shop turnings	3.00 to 3.50
No. 1 busheling	4.50 to 5.00
No. 2 busheling	2.75 to 3.25
Rails for rolling	6.50 to 7.00
No. 1 locomotive tires	7.00 to 7.50
Short rails	9.00 to 9.50
Cast iron car wheels	6.50 to 7.00
No. 1 machinery cast	6.50 to 7.00
No. 1 railroad cast	6.00 to 6.50
Burnt cast	4.25 to 4.75
Store plate	4.25 to 4.75
Agricultural malleable	0.75 to 1.25
Railroad malleable	7.00 to 7.50

DETROIT

Dealers' buying prices per gross ton:	
Hvy. melting steel	\$5.00 to \$5.50
Borings and short turnings	3.00 to 3.50
Long turnings	2.75 to 3.25
No. 1 machinery cast	7.75 to 8.25
Automotive cast	8.00 to 8.50
Hydraulic comp. sheets	4.50 to 5.00
Store plate	3.00 to 3.50
New No. 1 busheling	4.00 to 4.50
Old No. 2 busheling	1.50 to 2.00
Sheet clippings	1.50 to 2.00
Flashings	3.00 to 3.50

CANADA

Dealers' buying prices per gross ton:	
Toronto Montreal	
Heavy melting steel	\$7.00 \$6.00
Rails, scrap	7.00 6.00
No. 1 wrought	6.00 5.00
Machine shop turnings	2.00 2.00
Boiler plate	5.00 4.50
Heavy axle turnings	2.50 2.50
Cast borings	2.00 2.00
Steel borings	2.00 2.00
Wrought pipe	7.00 7.00
Steel axles	7.00 7.00
Axles, wrought iron	11.00 11.00
No. 1 machinery cast	12.50 10.00
Store plate	10.00 8.00
Standard car wheels	10.00 8.50
Malleable	10.00 8.00

Warehouse Prices for Steel Products

Open hearth spring steel, bases	4.50c to 7.00c
Common wire nails, base, per keg	\$3.60
Machine bolt, cut thread:	
1/2 x 6 in. and smaller, .65 to .65 and 10	Off List
1 x 30 in. and smaller, .65 to .65 and 10	Off List
Carriage bolts, cut thread:	
1 1/2 x 6 in. and smaller, .65 to .65 and 10	Off List
1 x 20 in. and smaller, .65 to .65 and 10	Off List
Boiler tubes:	
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.04
Charcoal iron, 4-in.	63.65
* No. 28 and lighter, 36 in. wide, 20c higher per 100 lb.	

ST. LOUIS

Base per Lb.	
Plates and struc. shapes	3.25c
Bars, soft steel or iron	3.00c
Cold-fin. rounds, shafting, screw stock	3.36c
Hot-rolled annealed sheets (No. 24)	3.70c
Galv. sheets (No. 24)	4.00c
Hot-rolled sheets (No. 10) up to and inc. 48 in. wide	2.00c
over 48 in. wide	3.15c
Black corrug. sheets (No. 24)	3.75c
Galv. corrug. sheets	4.05c
Structural rivets	4.00c
Boiler rivets	4.00c
Per Cent Off List	
Tank rivets, 7/16 in. and smaller, 100 lb. or more	65
Less than 100 lb.	65
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55
Hot-pressed nuts, hex. blank or tapped, 200 lb. or more	65
Less than 200 lb.	55

PHILADELPHIA

Base per Lb.	
*Plates, 1/4-in. and heavier	2.45c
*Structural shapes	2.45c
*Soft steel bars, small shapes, iron bars (except bands)	2.45c
Reinforce. steel bars, sq., twisted and deformed	2.30c
Cold-finished steel bars	2.95c
*Steel hoops	3.00c
*Steel bands, No. 12 to 3/16 in., incl.	3.75c
Spring steel	5.00c
*Hot-rolled annealed sheets (No. 24)	3.15c
*Galvanized sheets (No. 24)	3.50c
*Hot-rolled annealed sheets (No. 10)	2.70c
Diam. pat. floor plates, 1/4 in.	5.00c
Swedish iron bars	5.60c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
* Base prices subject to deductions on orders aggregating 4000 lb. or over.
† For 50 bundles or over.

CLEVELAND

Base per Lb.	
Plates and struc. shapes	2.95c
Soft steel bars	2.75c
Reinforce. steel bars	1.75c to 1.95c
Cold-fin. steel bars	2.95c
Flat rolled steel under 1/4 in.	2.00c
Cold-finished strip	5.55c
Hot-rolled annealed sheets (No. 24)	3.25c
Galvanized sheets (No. 24)	3.50c
Hot-rolled sheets (No. 10)	3.00c
Black ann'd wire, per 100 lb.	\$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.10

* Net base, including boxing and cutting to length.

CINCINNATI

Base per Lb.	
Plates and struc. shapes	3.25c
Bars, soft steel or iron	3.00c
New billet reinforce. bars	3.00c
Rail steel reinforce. bars	3.00c
Hoops	3.90c
Bands	3.30c
Cold-fin. rounds and hex.	3.32c

Squares and flats

Roosevelt's Bathing Pool To Be Built of Concrete

WASHINGTON, April 4.—While consideration was given to the building of a steel swimming pool at the White House for President Roosevelt, it was finally decided by the Office of Public Buildings and Public Parks to construct it of concrete. The pool is to be built into the ground in the west terrace of the White House, and it is reported that engineers and architects decided that concrete would lend itself best to this form of construction. Bids will be asked soon.

Steel Castings Orders Lower in February

WASHINGTON, April 4.—Bookings of commercial steel castings in February were 11,857 tons compared with 12,942 tons in January, according to reports made to the Bureau of the Census by 130 plants. The orders consisted of 9368 tons of miscellaneous castings and 2489 tons of railroad castings. The production of commercial steel castings in February was 12,438 tons against 13,951 tons in January.

Orders for malleable castings in February totaled 11,005 tons against 12,404 tons in January, according to reports received by the Bureau of the Census from 115 establishments. Production rose to 13,432 tons from 12,577 tons.

Large Building Program Proposed at Washington

WASHINGTON, April 4.—Proposals looking to a huge public works program were laid before Secretary of Labor Frances D. Perkins at conferences held at her request last Friday with about 65 organized labor leaders, social workers and economists. The conferences also dealt with direct relief aid in connection with the civic and economic problems confronting the wage earners of the country.

Her conferees told Miss Perkins that great haste must be made in putting through a public works program based on works already planned or designed. It was suggested that money for the program be raised by flotation of "baby" bonds. Robert D. Kohn, chairman of the Construction League of the United States, presented figures showing that \$3,000,000,000 in public works construction would put 1,000,000 men directly to work and that it would engage another 1,000,000 indirectly.

One of the basic essentials of a public works program as emphasized by those present must be the fixing of definite standards of hours, working conditions and wages in all Government contracts. Miss Perkins said

that the time has passed for the Government to sponsor negative and static labor policies. What is needed, she added, is a positive and dynamic program.

Further conferences will be held and it is hoped to present a definite program soon which it is understood will be submitted to President Roosevelt to aid the administration in making recommendations to Congress.

R.F.C. Grants Small Loans To Two Municipalities

WASHINGTON, April 4.—More than \$5,000 of meters and galvanized pipe will be required for improvement of the waterworks system of Roseville, Ohio, which has been granted a loan of \$15,500 for that purpose by the Reconstruction Finance Corporation.

Richmond, Ky., will spend \$10,000 for materials in connection with an R. F. C. loan of \$40,000 to be used in reconstructing the distribution system for the town's gas plant. The loan is subject to the satisfactory decision of the Court of Appeals of Kentucky that the town has the legal right to issue its revenue bonds for the purpose stated.

Dutch Pig Iron Cleared of Dumping Charge

WASHINGTON, April 4.—The Bureau of Customs, Treasury Department, has dismissed the complaint of Eastern pig iron makers that Royal Dutch pig iron is being dumped into the United States. The case was disposed of about one month ago, but, as in all proceedings where dumping is held not to exist, it has made no announcement of its action.

The bureau has begun an investigation based on a complaint that creosote oil is being dumped into the United States. It is reported that steel makers were among the complainants, though the bureau will not verify the report nor indicate the countries from which it is alleged the oil is being dumped. Steel makers are interested inasmuch as creosote oil comes from the by-product coke oven.

Complaint also has been made charging dumping of ferromanganese from Germany. The bureau has issued a notice of suspected dumping and has ordered suspension of liquida-

tion and withholding of appraisal of entries. Meanwhile the material is entered for the warehouse under anti-dumping bonds required of importers. These bonds are equivalent to the invoice value of the entries.

R.F.C. Lends \$8,075,000 for New York Tenements

WASHINGTON, April 4.—Agreement of the Reconstruction Finance Corporation to advance up to \$8,075,000 to Fred F. French Operators, Inc., agent for the Knickerbocker Village Corp., New York, marks the first loan made to wipe out a slum district, and means a modern housing development to replace one of New York City's worst sections, including the famous "lung block" of the 1890's. While it is not expected that the entire sum will be required, the amount advanced will depend upon the actual cost of land and buildings.

The development, to be known as Knickerbocker Village, will be comprised of two 12-story and basement, fireproof, steel and concrete construction apartment building units containing 1630 apartments and 6030 rooms. The project involves the purchase of all land in the blocks bounded by Catherine, Monroe, Market and Cherry streets. The site virtually abuts the Brooklyn bridge approach.

It is estimated that the cost of materials to be required will be approximately \$3,000,000 and that 10,000 men will be employed directly or indirectly for a period of one year on the project. Several thousand will be engaged in producing materials for the development.

Fabricated Structural Steel Orders Decline

Bookings of fabricated structural steel in February, according to the American Institute of Steel Construction, declined from those of January, last month's total having been 63,203 tons against 73,608 tons in the previous month, but February reports were received from only 150 fabricators, while 167 reported for January.

The institute comments on the fact that fabricated steel bookings are running only about three-fourths of those in the early part of 1932.

A comparison of February figures with those of January, this year, and February, 1932, follows:

	Fourth Quarter (1932) Average per Month	*January, 1933	February, 1933
Number of companies reporting.....	150	167	176
Tonnage booked.....	63,203	73,608	50,883
Tonnage shipped.....	59,134	50,894	45,910
Tonnage on hand for future fabrication—			
Companies reported.....	(73)119,107	(87)172,394	(86)285,841
Companies reporting no work ahead.....	43	47	56
Companies making no report on work ahead	34	33	84
Percentage of industry reporting.....	73	75	77

*Revised.

What the Machine Has Done to Us

(Continued from Page 545)

and shows relative physical volume of production and value added by manufacture derived by deflating the value figures by the index number of wholesale commodity prices. A comparison of these curves with the corresponding curves of Chart 29 emphasizes the importance of considering both the value and physical volume figure in comparing outputs of industries as a whole or of individual enterprises, even for succeeding years. Thus the sharp reduction of value output in 1921 is reflected in a retardation in rate of growth rather than an absolute reduction when translated into terms of physical volume. In point of fact, as has already been pointed out, the price decline of 1921 was accentuated by a commodity panic and thus exaggerated the deflation. It is certain that the correct value lies somewhere between and that there was an absolute shrinkage of physical volume as corroborated by the volume figures to be taken up later.

Average Output per Wage Earner

Chart 31 shows respectively the average output per wage earner on a value basis and on a physical volume basis both as to total production and as to value added by manufacture. The outline of the curve suggests that both money value of production per wage earner and money value added by manufacture per wage earner have advanced in general in accordance with the "S" curve characteristics.

The physical volume of production per wage earner and physical volume equivalent of value added by manufacture do not tell quite so clearly defined a story because they are unduly influenced by the violent commodity price fluctuations during and following both the Civil War and the World War. Thus both these latter curves are abnormally depressed in 1869 by the relatively high commodity price level resulting from the Civil War. They are again abnormally depressed in 1919 in response to the excessively high commodity prices resulting from the World War. On the other hand, both curves are distorted by the violent recession of commodity prices in 1921 and again in 1931.

Chart 33 shows in its upper part the results of a computation intended to reflect the advancing degree of mechanization in the manufacturing industries and its changing effect on output per wage earner. The computation is made by calculating the horsepower per wage earner and the output per wage earner (production and value added); then dividing the former by the latter. The term "wage earner" actually cancels out but has been here retained merely to emphasize the thought that the result should represent the output the

average individual wage earner has been able to accomplish with the facilities put into his individual hands.

Chart 33 shows in its lower part the results of similar computations made on a physical volume instead of on a money value basis.

Before attempting an analysis of Chart 33 it will be well to examine Chart 34. As previously pointed out, physical volume data derived from value data is subject to distortion due to abnormal price fluctuations and

(Continued on Advertising Page 10)

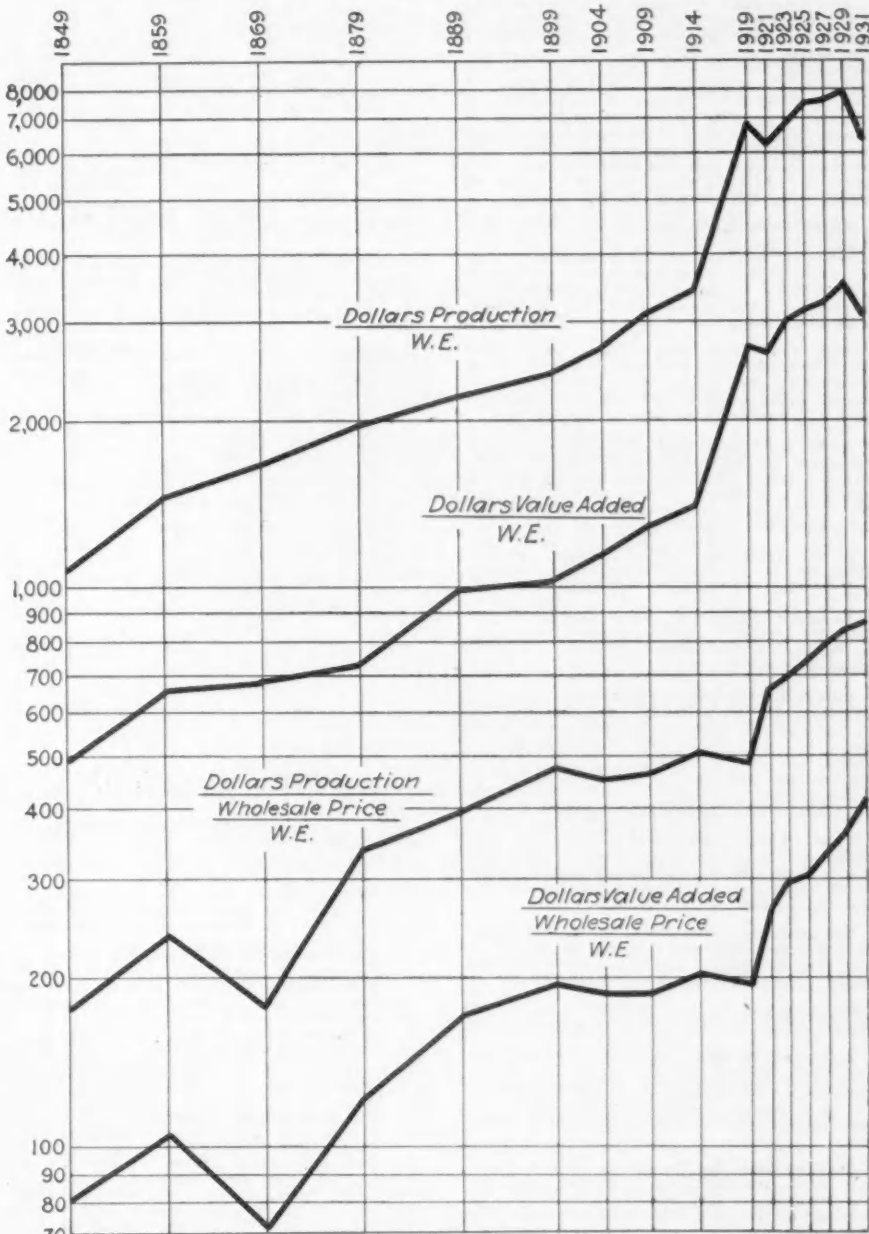


Chart 31—Dollar Volume and Physical Volume of Production, per Wage Earner

Year	\$ Production W. E.	\$ Value Added W. E.	\$ Production W. P. I. W. E.	\$ Value Added W. P. I. W. E.
1849	1,065	485	1,773	8,065
1859	1,440	651	2,358	16,800
1869	1,646	679	1,750	7,265
1879	1,963	722	3,330	12,260
1889	2,205	990	3,870	17,250
1899	2,420	1,025	4,640	19,630
1904	2,700	1,150	4,535	19,630
1909	3,125	1,290	4,630	19,100
1914	3,480	1,408	5,110	20,700
1919	6,890	2,759	4,965	19,880
1921	6,280	2,638	6,435	27,000
1923	6,910	2,947	6,850	29,250
1925	7,490	3,195	7,225	30,850
1927	7,510	3,300	7,875	34,600
1929	7,970	3,610	8,265	37,400
1931	6,345	3,060	8,695	41,900

W. P. I.—Wholesale Price Index.
W. E.—Wage Earner.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Pan-American Petroleum & Transport Co., 122 East Forty-second Street, New York, is negotiating for purchase of Crown Central Petroleum Corp., Houston, Tex., with large refinery on Houston ship channel, and affiliated interests, including Crown Central Pipe Line Co., Utilities Oil & Refining Co., and Argus Oil Co. Expansion is planned at Houston refinery, with installation of equipment. Cost over \$1,000,000 with machinery. With this acquisition, Pan-American company will postpone or abandon plans for oil refinery at Texas City, Tex., where site was acquired.

Allied Brewing Corp., 25 Broadway, New York, recently organized, will soon begin erection of new brewery at Long Island City, where site has been purchased, to include power house, pumping station, machine shop and other departments. Cost over \$1,500,000 with machinery.

Rich & McLean, Inc., 9 Park Place, New York, manufacturer of parts for typesetting machinery and allied specialties, has purchased group of four and five-story buildings at Gold and Spruce Streets for expansion.

A. W. Buhlmann, Inc., New York, has been organized by A. Walter Buhlmann, 200 Fifth Avenue, textile engineer, and Walter C. Buhlmann, 14 Martense Place, Mount Vernon, N. Y., to operate a general machine works for production of parts and equipment.

J. F. Trommer, 1632 Bushwick Avenue, Brooklyn, is planning expansion at brewing plant. Cost over \$150,000 with equipment.

Borough Roofing & Sheet Metal Works, Brooklyn, recently organized, has leased space in building at 556 Rogers Avenue for sheet metal-working plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 11 for one electric arc-welding set and spare parts (Schedule 9859), 5390 ft. bronze flexible steam hose (Schedule 9844), two steam deck winches and spare parts and one steam deck capstan and spare parts (Schedule 9845) for New York Navy Yard.

Turell Steel Corp., New York, has been organized by Nicholas Hawrylko, 109 St. Marks Place, New York, and Samuel Silver, 80 Woodruff Avenue, Brooklyn, to manufacture steel specialties.

Utica Brewing Co., Utica, N. Y., operating Fort Schuyler Brewery, is planning expansion and improvements, including new bottling plant. Cost over \$75,000 with machinery.

Seaboard Machine Co., New York, has leased shop space in building at 23-25 Beaver Street.

Electro-Craft, Inc., Yorktown, N. Y., has been organized by William J. Fichter, Knollwood Road, Greenburgh, N. Y., and Henry J. Young, 9 Locust Avenue, Harrison, N. Y., to manufacture electrical and mechanical products.

Paragon Mfg. Co., 98 Murray Street, Newark, N. J., manufacturer of automobile parts and equipment, has leased second floor of building at Tichenor and Hermon Streets for new plant.

Puritan Dairy, 315 High Street, Perth Amboy, N. J., let general contract to Paul M. Sterling, Inc., 230 Park Avenue, New York, for two-story plant, 75 x 125 ft. Installation will include processing machinery, refrigerating machinery, electric pumping equipment, boilers and accessories. Cost over \$80,000 with equipment. Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect and engineer.

Electroloy Co., Inc., Plainfield, N. J., has been organized by Roy M. Taylor, 1328 Watchung Avenue, and associates, to manufacture metal products.

Maguire Corp., Perth Amboy, N. J., care of G. M. Ricci, 175 Smith Street, architect, has plans for new brewing plant, consisting of three main units, three-stories, 55 x 100 ft., two one-story, 100 x 225 ft., and power house, 35 x 80 ft. Cost about \$200,000 with machinery.

Sun Oil Co., 1608 Walnut Street, Philadelphia, is planning expansion and improvements at refining plants at Marcus Hook, Pa., Toledo, Ohio, and Yale, Okla., with machinery for recovery of propane gas from crude oil. Company has recently arranged construction budget of \$4,000,000 for 1933, and large part of this will be used for program noted.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until April 10 for 150,000 aluminum plain washers, 10,000 plain steel washers, and 1500 blank steel washers (Aero Req. 1040), 10,000 ball and socket joint terminals (Aero Req. 1049), 100,000 steel nuts, 3000 castellated shear nuts, 75 gross machine screws, 150,000 steel hexagon castellated nuts, 1000 steel eye bolts, 200 steel clevis bolts, 37 gross alloy-steel machine screws, and 450 gross cadmium-coated steel machine screws (Aero Req. 1042).

City Park Brewing Co., Twenty-ninth and Parrish Streets, Philadelphia, has plans for expansion and improvements, including equipment. Cost over \$65,000. William F. Koelle & Co., 1633 Race Street, are engineers.

Standard Oil Co. of Pennsylvania, Ledger Building, Philadelphia, plans new bulk oil storage and distributing plant at Towanda, Pa. Cost over \$35,000 with tanks and equipment.

Deppen Brewing Co., Reading, Pa., is planning expansion and modernization program, including additional equipment. Cost over \$50,000.

John D. Ward Brass & Iron Foundry, Inc., Elmira, N. Y., has been organized by John D. Ward, Lower Maple Avenue, Elmira, and Morton Patterson, Main Street, Wellsburg, N. Y., to manufacture metal castings.

Cataract Products Corp., 13 Cataract Street, Rochester, N. Y., has plans for one-story and basement addition, 65 x 200 ft., to brewing and beverage plant, primarily for bottling unit. Cost over \$70,000 with equipment.

Sidney B. Roby Co., jobber in iron and steel and mill supplies, whose building at 208 South Avenue, Rochester, N. Y., was recently destroyed by fire, will rebuild at once on old site, and meanwhile is occupying temporary warehouse space at 62 Marshall Street.

◀ SOUTH ATLANTIC ▶

Cloverdale Brewing Co., Bolton Street, Baltimore, is considering plant extensions and improvements, including machinery. Company has acquired controlling interest in Cloverdale Spring Water Co. A stock issue of 752,900 shares has been arranged, considerable portion of fund to be used for program noted.

Glover Machine Works, Inc., Marietta, Ga., manufacturer of machinery and parts, has broken ground for first unit of new plant on 100-acre tract near Cordele, Ga.; it will be one-story, 100 x 160 ft., equipped for production of electric steel castings. Later building will be extended to 700 ft. long, and operations concentrated at this point. Company also plans erection of pattern shop, mechanical and chemical laboratory, storage and distributing unit and office building. Entire project will cost over \$100,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until April 17 for wire rope, steel springs, car wheels, cable, sheet iron or steel, pipe fittings, bolts, nuts, rivets, electric drills, screw spikes, transformers, insulated wire, metal valves, hose couplings and other mechanical equipment (Schedule 2856).

Board of City Commissioners, Miami, Fla., is considering a municipal electric light and power plant in connection with extensions and improvements in city waterworks. It is proposed to arrange fund of \$470,000 for work. L. L. Lee is city manager.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 11 for six motor-driven rotating pumps (Schedule 9843) for Annapolis Navy Yard; 12 pneumatic riveting hammers and five portable pneumatic drills (Schedule 9836) for Boston Navy Yard; motor-driven boiler tube cleaning outfits and equipment (Schedule 9829) for Brooklyn, Philadelphia, Mare Island and Puget Sound yards, seven 1-ton and one 3-ton hand-operated trolley hoists (Schedule 9835) for Eastern and Western yards; until April 18, wire rope and seizing strand (Schedule 9854), 1200 aluminum chairs (Schedule 9833) for Eastern and Western yards; five flat railway cars, 60,000-lb. capacity, and three box cars (Schedule 9861) for Lualaba and West Lock naval stations; about 375 aluminum alloy propeller blades and 24 metal aircraft propeller hubs (Schedule 9856) for Philadelphia and San Diego yards.

◀ CENTRAL DISTRICT ▶

Marie Gas & Oil Co., Law and Finance Building, Pittsburgh, plans expansion in oil storage and distributing plant on Herra Island, including installation of equipment. Company will carry out general development plan in properties, purchasing operating equipment and new steel barges. Financing is being arranged for \$250,000, considerable part of fund to be used for purpose noted.

National Radiator Corp., Johnstown, Pa., has had reorganization plans approved, providing for acquisition of properties and issuance of securities by new corporation. Production will be increased at main plant and Johnstown, and operations resumed at branch plant at Trenton, N. J.

Erie Brewing Co., Erie, Pa., has begun plant expansion and modernization program. Cost over \$75,000 with machinery.

Charleston Body & Mfg. Co., Owens, W. Va., has been organized by C. W. Hickman and J. K. Lance, both of Charleston, to manufacture automobile bodies and automotive equipment.

Union Brewing Co., New Castle, Pa., recently organized, has taken over former plant of Standard Brewing Co., and has work under way on extensions and improvements. Additional machinery will be installed. Cost over \$60,000 with equipment.

Cleveland & Sandusky Brewing Co., 2600 Carroll Avenue, Cleveland, H. C. Lang, president, has plans for two new multi-story additions to plant on East Fifty-fifth Street, including additional equipment. Improvements will be made in present brewery. Cost about \$250,000, of which approximately \$150,000 will be used for machinery. E. A. Broberg, 2014 West Fifty-third Street, is architect.

Battery Grid Machine Co., Inc., Cleveland, has been organized by C. H. Judkins and Walter Van Hoefen, 801 Marshall Building, and associates, to manufacture special machinery and parts.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until April 12 for oil temperature rod assemblies, oil temperature regulator shutter levers, bell cranks and other equipment (Circular 498); until April 17, 2828 engine control assemblies (Circular 482), fire extinguishers and brackets (Circular 488), 7500 gas valve assemblies (Circular 481), 25 turning, wiring and burning machines, 15 tinner's beadlers and crimpers, 10 tinner's beadlers, 20 tinner's bench formers (Circular 490), turnbuckle barrels, rod and clevis, turnbuckle assemblies, etc. (Circular 487).

Forest City Brewing Co., Cleveland, recently organized to take over Brewery, Union Avenue, S. E., has approved expansion and improvement program. Cost about \$400,000 with equipment. J. M. Harris is head.

Great Lakes Sugar Co., Findlay, Ohio, is planning improvements in beet sugar mill, including machinery replacements and new equipment.

Zanesville Brewing Co., Zanesville, Ohio, affiliated with Ohio Ice Co., same city, H. A. Chrisner, general manager, is considering erection of new plant. Cost over \$200,000 with machinery.

Sinker-Davis Co., 230 South Missouri Street, Indianapolis, manufacturer of boilers, governors, saw mill machinery, etc., has purchased plant and business of Fire-King Stoker Co., 44 South Capitol Avenue. Stoker production in future will be concentrated at plant of purchasing company, where line will be developed, including parts manufacture and assembling.

City Council, Washington, Ind., is considering fund of about \$200,000 for extensions and improvements in municipal sewage system, including disposal plant, and installation of machinery, pipe lines, etc.

Tivoli Brewing Co., 10129 Mack Avenue, Detroit, will make improvements in plant, including installation of storage facilities and equipment. Howard H. Colby is executive vice-president.

Frankenmuth Brewing Co., Frankenmuth, Mich., is considering erection of one-story addition, initially for storage and distribution, and later to be equipped as a brewery. Present cost about \$40,000.

Brunswick-Balke-Collender Co., Muskegon, Mich., manufacturer of bar and tavern equip-

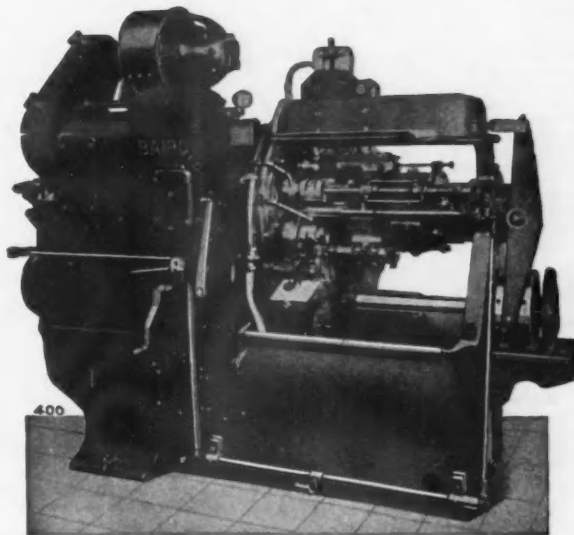


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BAIRD HORIZONTAL AND VERTICAL, MULTIPLE SPINDLE, AUTOMATIC LATHES FOR CHUCKED AND FOR CENTERED WORK UP TO 11½" DIAMETER, show savings in the operations of turning, facing, boring, reaming, drilling, chamfering, milling, threading, &c.

Automatic Chucks and Automatic Controls leave the operator the least work to do, that of simply taking out finished work and putting in the machine another piece of work. In some cases the machine does that too.

The feature of "TURN AROUND JOB" in connection with Double Indexing is an exclusive "BAIRD" detail. After passing through the machine for one operation the work is turned around and immediately sent through the machine a second time and operated on from the other end.



BAIRD 7" 6 Spindle Horizontal Lathe

BAIRD MULTIPLE SPINDLE, VERTICAL, INTERNAL GRINDER.

The features of Automatic Mechanical Chucks as embodied in the Baird Automatic Lathes apply to this Automatic Grinder also.

The Grinding Wheels in this Baird Machine can each be according to the requirements of the work at each grinding station as to size, kind, speed, amount of feed, amount taken off in truing the wheel and the readjustment because the mechanical details governing these factors at each wheel are all independent of any other wheel.

Two different diameters of holes may be ground at the one pass through the machine.

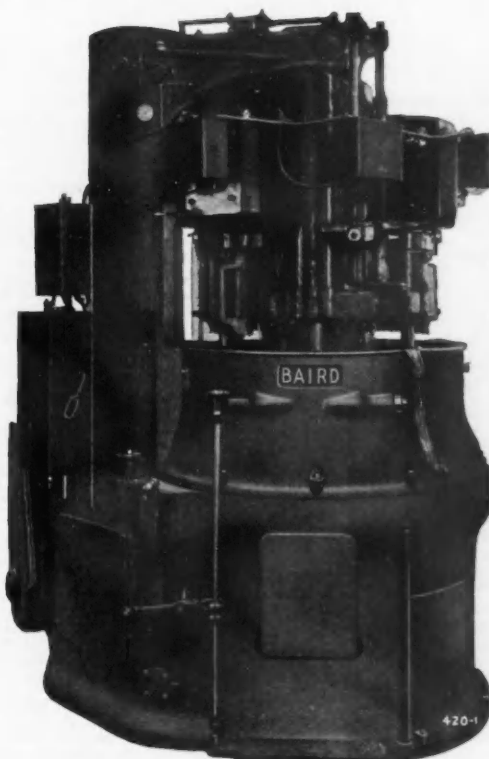
Double Indexing and "THE BAIRD TURN AROUND METHOD" are also applicable to this machine.

Never mind what we may have done for others but send along sample and/or prints of your own work stating quantities, for an engineering study and report without obligation.

"Ask BAIRD About It"

THE BAIRD MACHINE CO.

BRIDGEPORT, CONN.



BAIRD 8 Spindle Internal Grinder

ment and fixtures, is arranging for resumption of operations, reinstating close to 1500 persons. Headquarters are at 629 South Wabash Avenue, Chicago.

City Council, North Muskegon, Mich., is planning installation of new pumping plant and filtration station for municipal waterworks. Cost about \$40,000 with machinery. Boulay & Harrison, 914 Summit Street, Toledo, Ohio, are consulting engineers.

Superior Sugar Refining Co., Menominee, Mich., recently organized, capital \$100,000, plans operation of a beet sugar refinery in this vicinity. Alfred A. Henes, Menominee, is head.

◀ NEW ENGLAND ▶

Penn Oil Burner Co., Clinton, Mass., organized a few months ago by Arthur Altman, Clinton, and associates, has leased part of local Rodger mill for manufacture of oil burners and oil-burning equipment for domestic service. Office building at site has been leased for company headquarters. Mr. Altman is treasurer; Joseph N. Gibbs is president.

Consumers Brewery Co., Inc., Providence, R. I., has arranged for change of company name to Consumers Brewing Co., Inc., at same time increasing capital to \$900,000, and plans improvements. Company has taken over former Elizabeth textile mills, Hillingrove, R. I., and will remodel for new brewery. Cost over \$175,000 with machinery.

Construction Service, Veterans' Administration, Washington, asks bids until April 11 for new pumping plant and machinery for institution at Bedford, Mass.

Empire Oil Burner Mfg. Co., Inc., Easthampton, Mass., has been organized by Alderice Fugere, 65 Northampton Street, and associates, capital \$50,000, to manufacture oil burners, oil-burning equipment and parts. Euclide Fugere, Easthampton, will be one of heads of company.

Hampden Extract Co., Williamansett, Mass., has let general contract to Casper Ranger Construction Co., 6 Newton Street, Holyoke, Mass., for extensions and improvements in brewing plant. Cost over \$70,000 with machinery.

Scott & Williams, Inc., Laconia, N. H., manufacturer of knitting machinery, parts, etc., is removing equipment from plant of subsidiary, Standard-Trump Brothers Machine Co., Wilmington, Del., to Laconia works, where expansion will be carried out and production largely concentrated.

◀ MIDDLE WEST ▶

Pure Oil Co., 35 East Wacker Drive, Chicago, plans expansion and improvements at oil refinery at Toledo, Ohio, including equipment. Cost about \$250,000 with machinery.

Department of Public Property, Springfield, Ill., Willis J. Spaulding, commissioner, plans early call for bids for building and equipment for municipal electric light and power plant. Cost over \$85,000 with machinery. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

Common Council, Morris, Minn., has plans for new municipal electric light and power plant, and will ask bids soon for building and equipment. Fund of about \$150,000 is being arranged. Robert J. Torrens, Shubert Building, St. Paul, Minn., is consulting engineer.

Metal Producers' Cooperative Association, Colorado Springs, Colo., care of Oliver H. Shoup, Colorado Springs, recently organized, is considering erection of new metal reduction plant near Boulder, Colo. Warwick M. Downing, Denver, is one of organizers.

City Council, Urbana, Ill., has surveys under way for a municipal electric light and power plant. Cost over \$100,000 with equipment. Warren & Ban Pragg, Inc., Milliken Building, Decatur, Ill., is consulting engineer.

Piston Expander Co. of Illinois, Inc., Aurora, Ill., has been organized by George L. Thon and C. F. Muench, with headquarters at 619 Loucks Street, to manufacture automobile equipment and parts.

Walter Brewing Co., Sixth Street and North Santa Fe Avenue, Pueblo, Colo., is planning improvement and modernization program. Cost over \$50,000 with machinery. Martin Walter, Jr., is general manager.

Elgin Eagle Brewing Co., Elgin, Ill., is considering extensions and improvements, in-

cluding additional machinery. Cost about \$50,000 with equipment.

Flour City Ornamental Iron Co., Twenty-seventh Avenue and Twenty-seventh Street, South, Minneapolis, has reacquired all of business assets in Minneapolis that had been held by General Bronze Corp., New York. Eugene Tetzlaff is president of Minneapolis company.

Waukesha Motor Co., Waukesha, Wis., reports receipt of orders during week of March 20-25 for 800 engines amounting to \$250,000. About 100 units are designed for motor trucks ordered by breweries; 200 for export to France and remainder for scattered domestic uses. Production is being stepped up from 18 per cent to 25 per cent of capacity.

South Side Malleable Casting Co., 2700 South Fifteenth Street, Milwaukee, sustained loss of \$50,000 by fire, March 20. Decision as to reconstruction awaits settlement of insurance.

◀ SOUTH CENTRAL ▶

Arbacoochee Mines & Smelters, Inc., 611 Martin Building, Edwardsville, Ala., recently organized by A. L. Stabler and associates, has taken over about 7,000-acre tract of gold properties in Arabacoochee, Ala., district, heretofore held by Elliott Mining & Engineering Co., and plans development program, with installation of drilling, mining and other machinery.

Elkhorn-Jellico Coal Co., Whitesburg, Ky., is planning to rebuild coal tippie at coal-mining properties. Damaged machine shop will also be replaced.

Mengel Co., Inc., Louisville, manufacturer of wire-bound boxes and containers, is increasing production schedule at local plant, also branch plant at St. Louis. More than 200 workers have been reinstated.

Board of Aldermen, Gretna, La., plans installation of pumping machinery and other equipment in new filtration plant for municipal water system. Fund of \$21,000 being arranged. Swanson-McGraw, Inc., Balter Building, New Orleans, is consulting engineer.

W. G. Bush Brick Co., Nashville, Tenn., plans rebuilding portion of foundry and brick-manufacturing plant on adjoining site, Tower Island, recently destroyed by fire. Loss about \$50,000 with equipment.

W. R. King, Birmingham, has made an offer for Universal Metal Mfg. Co., Birmingham, placed in bankruptcy two years ago and since operated by a trustee. A hearing on offer has been set for April 4.

◀ SOUTHWEST ▶

Falstaff Brewing Corp., 3684 Forest Park Boulevard, St. Louis, is planning expansion and modernization program, including three-story addition and installation of machinery for daily capacity of about 1600 bbl. Cost close to \$300,000 with equipment. Company is disposing of stock issue of \$1,239,000, part of fund to be used for purpose noted. Joseph Griesedieck is president.

Day & Night Auto Safety Signal Co., Inc., 915 Olive Street, St. Louis, C. T. Jamison, president, recently organized, will manufacture a new automobile steering wheel and other automotive equipment. Production will be carried out at plant of Master Tool & Machine Co., 1609 North Broadway.

City Council, Great Bend, Kan., has called special election to approve bonds for \$150,000 for erection of municipal power plant and system. Entire project to cost about \$340,000 with equipment. Other financing will be arranged later. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Quincy Brewing Co., Quincy, Ill., operated by Dick & Brothers, is planning extensions and modernization in branch storage and distributing plant at Kansas City, Mo., with installation of mechanical-handling and other equipment. Cost over \$40,000.

Armour & Co., Union Stock Yards, Chicago, are planning to rebuild car and repair shop at Kansas City, Kan., recently damaged by fire. Cost over \$30,000 with equipment.

Crescent Refining Co., Holdenville, Okla., has work under way on new oil refinery near city, primarily for gasoline production. Cost over \$85,000 with machinery. H. H. Pegg, Allen, Okla., is engineer.

Houston Ice & Brewing Co., Houston, Tex., has plans for new brewery near city limits, including power house, pumping plant and other departments. Cost about \$265,000 with equipment. William Peddicord, Houston, is architect.

Panama Refining Co., Kilgore, Tex., plans rebuilding oil refinery recently damaged by fire. Cost close to \$35,000 with equipment. Company has recently been chartered under State laws by W. H. Sanders and Thomas Potter, Kilgore.

Doherty Stone Drill Co., Clay Street, Houston, Tex., manufacturer of oil-well drilling machinery, etc., has taken over building on Calhoun Road for new plant unit. Cost about \$25,000. Headquarters of company are at 714 West Tenth Street, Los Angeles.

◀ PACIFIC COAST ▶

Don Carlos Brewing Co., Los Angeles, has plans for new brewery on 15-acre tract in western part of city, with power house, pumping plant, machine shop and other departments. Cost about \$450,000 with machinery. Bryant & Shaw, 1610 Cosmo Street, are architects in charge.

Shell Oil Co., 108 West Second Street, Los Angeles, plans rebuilding and repairing oil refinery at Dominguez, near Los Angeles, recently damaged by earthquake, including power house, furnaces, pipe lines, etc. Cost over \$200,000.

Water and Power Commission, Los Angeles, has authorized fund of \$524,870 for extensions and improvements in city power system, including transmission and distributing lines, power substations and other structures. Bureau of Power and Light, 207 South Broadway, is in charge.

William Dreher, 509 North Tenth Street, Sacramento, Cal., and associates have authorized plans for a new brewing plant, with main multi-story unit and auxiliary structures. Cost over \$400,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 11 for one motor-driven radial drill press (Schedule 9820); until April 18, three motor-driven sensitive drilling machines (Schedule 9827), one motor-driven vertical band resaw (Schedule 9847) for Puget Sound Navy Yard; 200 oxygen cylinders (Schedule 9798) for San Diego yard; eight 80-gal. aluminum or corrosion-resisting steel kettles (Schedule 9831), corrosion-resisting steel wire rope (Schedule 9851), five portable electric pumps and spare parts (Schedule 9857) for Mare Island Navy Yard.

Mammoth Mines Corp., care of Earl Pulver, 2120 Smith Tower Building, Seattle, is considering new reduction plant for copper mining near Butte, Mont., with installation of mining machinery, etc. Cost over \$100,000 with equipment.

Horluck's, Inc., Westlake Avenue and Mercer Street, Seattle, has plans for new one-story brewery. Cost about \$60,000 with equipment. George Horluck is president.

Standard Oil Co. of California, 605 West Tenth Street, Los Angeles, will rebuild bulk oil storage and distributing plant at Wintersburg, Cal., damaged by recent earthquake. Cost about \$75,000 including tanks and other equipment.

Board of Public Works, Seattle, asks bids until April 26 for completion of Diablo power plant and construction of double transmission line on steel towers, forming section of municipal power development on Skagit River. Cost about \$1,620,000. J. D. Ross, superintendent, city lighting department, in charge.

◀ FOREIGN ▶

Alfredo B. Duarte, Merida, Yucatan State, Mexico, has organized a company to erect a sugar refinery. Local site has been acquired and construction will proceed on several one-story units. Cost over \$150,000 with machinery.

German National Railways, Berlin, Germany, are planning electrification of line from Augsburg to Nuremberg, about 87 miles, at cost of 33,000,000 m. (about \$7,850,000) including steel tower electric system and railway equipment. Plans also are being considered for electrification of line from Magdeburg to Halle, about 54 miles, at cost of 9,000,000 m. (about \$2,140,000).

Ministry of Interior, Chinese National Government, Peking, China, is planning erection of Government-owned plant for manufacture of ammonium sulphate and heavy industrial chemicals. Cost, 11,000,000 yuan (about \$2,100,000) with machinery.

Ministry of Communications, Paris, France, has authorized erection of nine new high-power broadcasting stations. Fund of 100,000,000 fr. (about \$4,000,000) has been arranged for work.

A NEW ELECTRIC HEADER



This machine is built under the Kobert Patents for which this company is exclusively licensed.

National's Latest Contribution

A HEADER, adapted for both steel and non-ferrous metals, and designed to supplement present methods for producing those jobs which have been headed with great difficulty. Parts made from stock which cannot be easily cold headed, but require the fine finish of cold work, can be produced to advantage on this new machine.

Cold blanks are automatically cut direct from a coil or fed from a hopper. The portion to be upset is heated electrically by an accurately controlled current, and since a very short interval elapses between heating and heading, the product has an excellent finish.

The range of practical heading work has been enlarged by this new National Automatic Electric Header. It fills a definite need.

For detailed information send prints or samples of your work.

The NATIONAL MACHINERY COMPANY
TIFFIN, OHIO

What the Machine Has Done to Us

(Continued from Page 571)

should be considered in the light of collateral evidence offered by statistics derived directly from physical volume data. The physical volume series used in Chart 34 was supplied by the National Industrial Conference Board, Inc. It is an extension of the series developed by the Bureau of the Census. Index numbers for production in manufacturing industries are computed by taking the relative production in volume (not value) of each individual commodity in each year as a percentage of its base year production and combining these percentages into an average by weighting each percentage by the importance of the particular commodity. The weights for manufactured commodities are based on the relative value added to materials in the process of manufacture as shown by the census of the base year. The quantitative figures from which the general average is computed are necessarily confined largely to commodities of a simple type.

Having already observed how the factor "wage earner" cancels out in the computation we may proceed at once to calculate the horsepower capacity per unit of physical volume as an index number directly from the

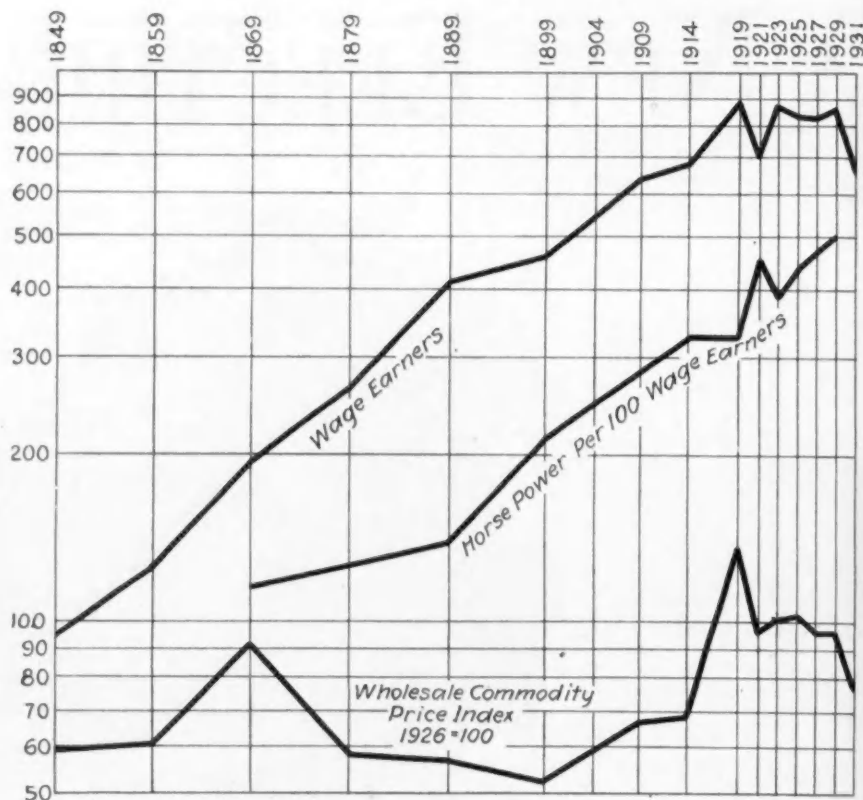


CHART 32 — Relation of Wage Earners to Horse Power per 100 Workers. (Based upon data previously published in this series)

figures for horsepower capacity and for physical volume of production. We thus obtain a curve comparable with the lowest of the four curves of Chart 33 and find it to be in substantial agreement in all of its movements except only that, being undistorted by violent price fluctuations, it shows a greater degree of evenness in movement. It probably reflects, therefore, more accurately the actual changes that have taken place and is the more suitable for analysis.

The Suggested Trend of Mechanization

Chart 35 represents an attempt to discover the trend of mechanization in the manufacturing industries in terms of the changing horsepower capacity provided per average wage earner for the average output of that wage earner in units of physical volume.

(Continued on Advertising Page 12)

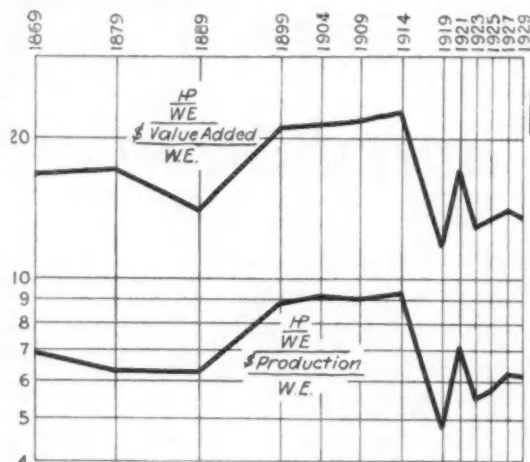
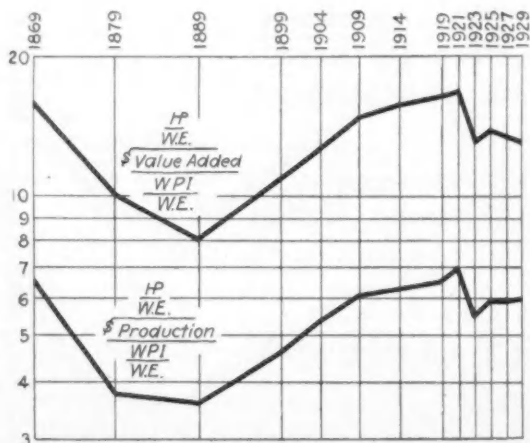


CHART 33 (a) — Mechanization with Respect to Dollar Volume of Production

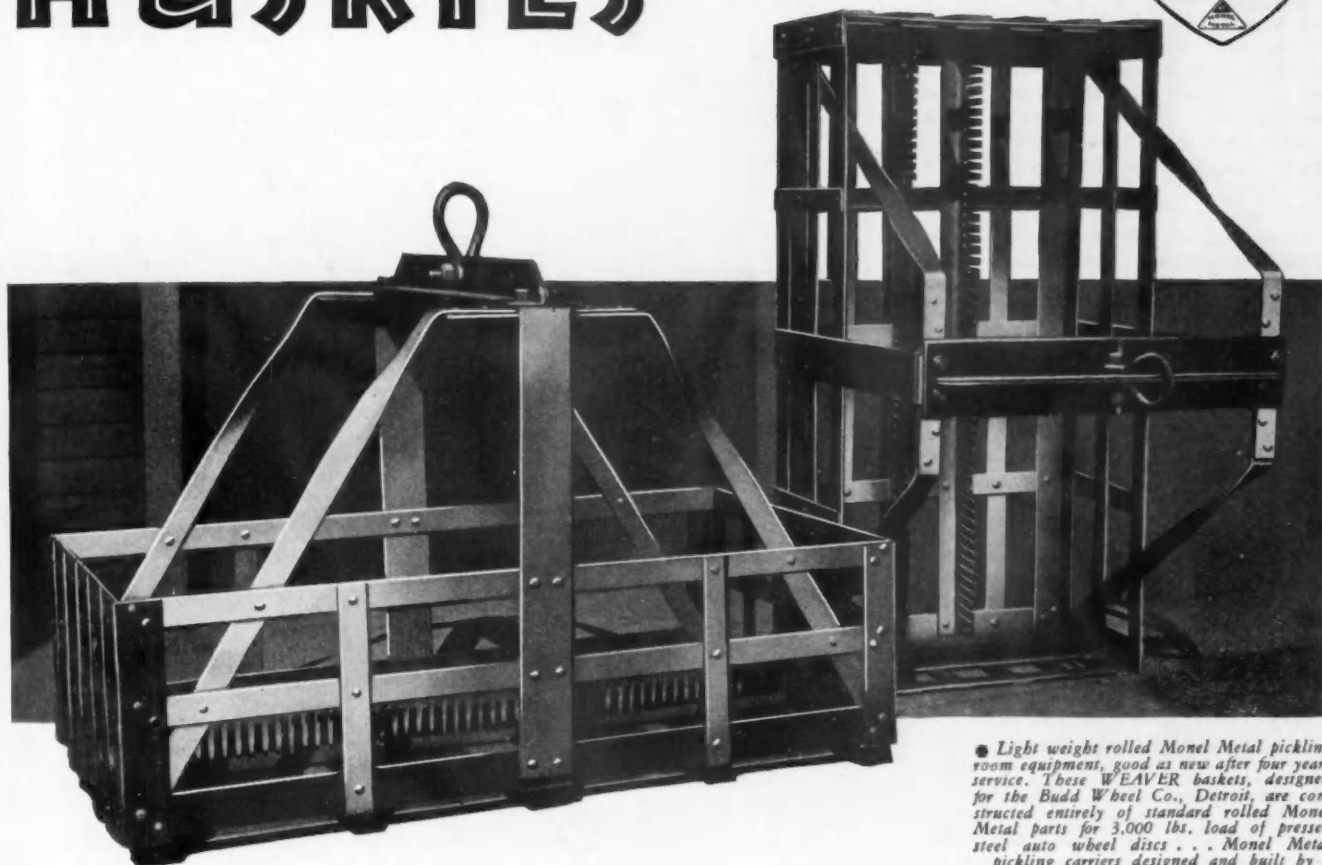
CHART 33 (b) — Mechanization with Respect to Physical volume of Production



Year	Relatives			
	Hp. W. E. \$ Value Added W. E.	Hp. W. E. \$ Production W. E.	Hp. W. E. \$ Value Added W. P. I.	Hp. W. E. \$ Production W. P. I.
1869	1,682	694	1,573	653
1879	1,729	636	1,018	375
1889	1,411	634	810	361
1899	2,095	888	1,095	463
1904	2,145	914	1,257	544
1909	2,190	904	1,480	610
1914	2,297	930	1,563	633
1919	1,181	473	1,639	657
1921	1,717	721	1,677	704
1923	1,278	545	1,288	550
1925	1,335	570	1,382	590
1927	1,410	619	1,343	590
1929	1,350	612	1,303	592

Hp.—Horsepower.
W. E.—Wage Earner.
W. P. I.—Wholesale Price Index.

HUSKIES



● Light weight rolled Monel Metal pickling room equipment, good as new after four years service. These WEAVER baskets, designed for the Budd Wheel Co., Detroit, are constructed entirely of standard rolled Monel Metal parts for 3,000 lbs. load of pressed steel auto wheel discs . . . Monel Metal pickling carriers designed and built by KLAAS MACHINE & MFG. CO., 4515 E. 49th St., Cleveland, Ohio.

15 TIMES THEIR OWN WEIGHT CARRIED SAFELY . . . IN BOILING ACID . . . IN THESE LIGHT WEIGHT MONEL METAL BASKETS

● Never let anyone tell you that pickling equipment must be heavy and cumbersome in order to be strong and durable. "Excess baggage" in the pickling department went out when Monel Metal equipment came in!

Consider these two Monel Metal pickling baskets. They're comparatively light in construction—yet they easily carry loads 15 times their own weight. After four years of constant daily service, they are still in perfect condition. Thanks to Monel Metal's rugged strength and high corrosion resistance, they don't show a sign of weakness—or even appreciable wear!

Note also their ingenious construction

which emphasizes Monel Metal's ready adaptability. Although these sturdy baskets were designed to meet the user's individual requirements, they are built entirely of standard rolled Monel Metal flats, angles, bolts and rivets. These parts, together with Monel Metal hooks, chain, tie-rods, wire and many other items used in the pickling room, are all available from stock.

Your regular fabricator or sheet metal contractor will tell you how Monel Metal equipment can pare down costs in your pickling department. Consult them—or write us.



Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

The results are not so incompatible with known facts as they might at first glance appear. The marked deviations above the indicated trend for the years 1869 and 1879 may have resulted from quite logical causes. The figures were certainly reported much less accurately than in more recent years. Power capacity of prime movers was much less accurately known before the development of electrical apparatus than it has been since. Water powers were a much larger proportion of total prime movers in factories in those days than they are now. They were probably reported more often on the basis of maximum flow than an average flow. Transmission by shaft, belt, rope drive and cast tooth gearing was much less efficient than modern transmission so that relatively much more prime mover capacity was required.

The deviation at 1921 scarcely requires further comment here. That maximum rate of increase in power capacity on the basis of output should not have occurred in the decade of the 1890's to correspond with maximum rate of increase in power capacity per wage earner is to be considered in the light of the more recent developments in the efficiency of the application of power to productive processes as a whole. Thus the trend line exhibits a contra-flexure within the decade 1910 to 1920, indicating a relative increase in the rate of physical productivity with respect to power input. This is in accord with the known increases in productivity that came with the development of mass production methods. As mass production is, by its very nature, applicable primarily to those industries accounting for a large share of total production, the effect on the average is prompt and pronounced.

The course of current development is as yet less certain since horsepower capacity figures beyond 1929 are not available at the time of writing. It is, nevertheless, a known fact that what might perhaps be called an application of some of the principles of mass production without the mass has

(Continued on Advertising Page 14)

Year	Physical Volume of Production Index Numbers 1926=100	Horsepower per Unit of Physical Volume Index Numbers 1926=100
1849	2.7	...
1859	4.1	...
1869	6.2	101.4
1879	12.3	74.3
1889	23.4	68.0
1899	36.3	74.6
1904	44.3	81.6
1909	57.8	85.7
1914	61.4	97.3
1919	77.8	101.0
1921	61.8	136.7
1923	94.4	94.0
1925	97.7	98.1
1927	98.8	105.3
1929	110.0	104.7
1931	74.2	...

Sources—National Industrial Conference Board, Inc.
Federal Reserve Board.
See "Statistical Abstract," 1932, p. 766.

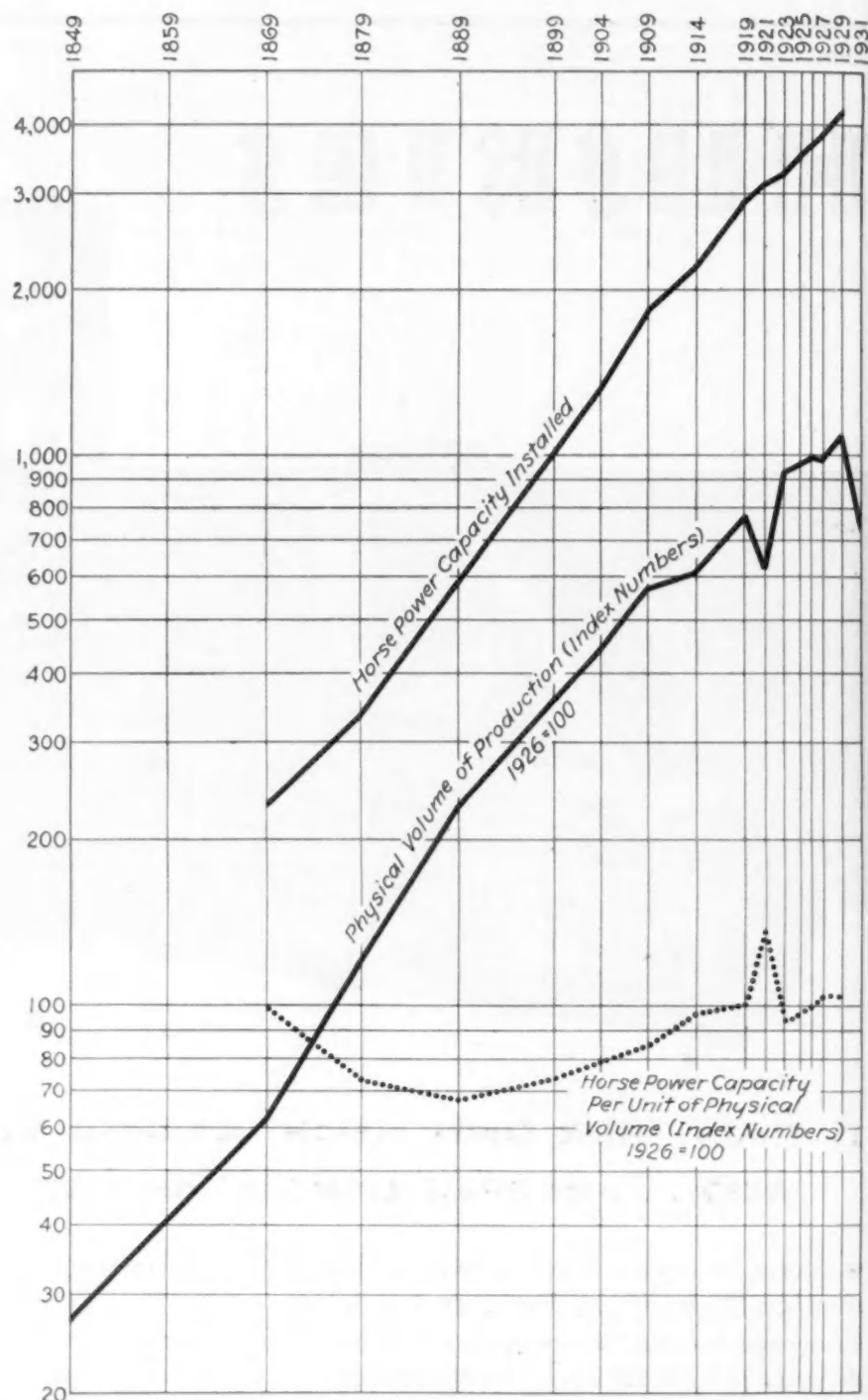
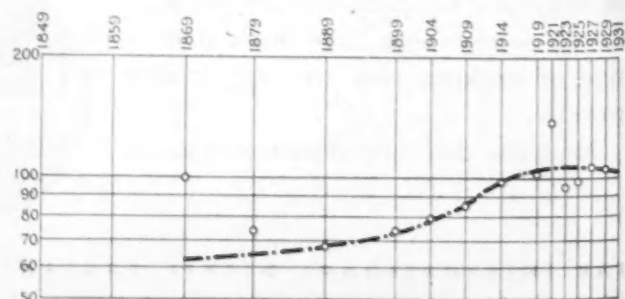


Chart 34—Relation of Horse Power to Physical Volume of Production, Computed on National Industrial Conference Board's Weighted Volume Series

CHART 35—Trend of Mechanization in Manufacturing in Terms of Unit Physical Volume per Average Wage Earner





but Gargoyle Lubricants stand up and assure smooth operation, lower costs

In many cases where equipment operates under high temperatures and severe pressures, burned-out bearings and operating delays frequently occur.

At the modern plant of the Central Iron and Steel Company in Harrisburg, Pa., however, bearing failures are held to a minimum and operating delays are almost unknown. Plant engineers give much of the credit for this smooth machine operation to Gargoyle Lubricants which, despite the severe conditions they must meet, stand up and provide adequate lubrication at all times.

Central's plant operating records show that, with Gargoyle Lubricants in use, oil cost per rolling hour is decreasing each year. In addition, maintenance and repair costs are being held to a minimum and

troublesome deposits have been entirely eliminated.

Records of leading plants in every industry show that, although oil cost amounts to less than 1% of total costs of conversion, correct lubrication can produce substantial savings. If you are interested in savings that may amount to many times the total annual cost of oil — ask a Socony-Vacuum representative to give you the facts about correct lubrication. He will be glad to show you lower-cost records made by plants in your own industry — operating under similar conditions to yours.

Socony-Vacuum Corporation,
26 Broadway, New York City.
Branches and distributors
throughout the world.



S O C O N Y - V A C U U M
C O R P O R A T I O N

MERGER OF STANDARD OIL COMPANY OF NEW YORK AND VACUUM OIL COMPANY

been spreading from industry to industry. It seems quite reasonable to expect that if the maximum has not actually been reached, as suggested, it is being approached more nearly.

Summary

Thus it appears that the output of manufacturing industry has two aspects—the one with respect to money value and the other with respect to physical volume. The relations between these two depend on the fluctuations in commodity prices; fluctuations which at times may become violent as to both rate and extent of change.

Value of output and volume of output must be considered in the aggregate and both on a per wage earner and a per horsepower basis owing to the wide changes in numbers of wage earners and in horsepower capacities provided over the period covered.

Consideration must be given value added by manufacture or its corresponding physical volume index as well as total value or total volume inasmuch as the products of one industry in many cases constitute the raw materials of others. Goods so passing from industry to industry would be included for both in totals but not in value added by manufacturing.

Underlying trends are disclosed with some degree of clarity in spite of lack of precision in absolute quantities because two methods of approach serve as checks on each other. While it is difficult to group in a single index number the vast aggregate of countless kinds of things involved, data are available both on a volume equivalent of value basis and on a direct volume basis.

The final curves of growth and trend of horsepower per wage earner for each unit of value output and each unit of volume output per wage earner suggest "S" curve characteristics as might be expected from the knowledge that these final curves are composites of the growth of value of output and physical volume of output, numbers of wage earners and horsepower capacity per wage earner; all of which suggest similar characteristics.

Results obtained from volume data are less distorted by violent price fluctuations than are results obtained from value data. Results from volume data are therefore selected as the more reliable indicators, after having been checked against results from value data.

Present indications suggest that horsepower per unit of physical volume has passed a maximum. Figures for 1931 and for 1933, when available, will certainly reveal abnormal deviations from indicated trend.

Close approach to a maximum is clearly indicated even though subsequently available data or unforeseen

developments may change the aspect of the immediate or near future situation.

Clutch Prevents Overloads on Machine or Motor

AUTOMATIC safety clutches designed to act quickly and thereby prevent building up an overload on either the driven machine or the motor are being offered by the G-O-B Engineering Co., Transportation Building, Chicago. The housing is loose on the driven machine shaft, thereby eliminating all friction when the pawl is disengaged. The designers recommend that the clutch be placed on the motor shaft, because with this arrangement a smaller clutch may be used with resulting low first cost.

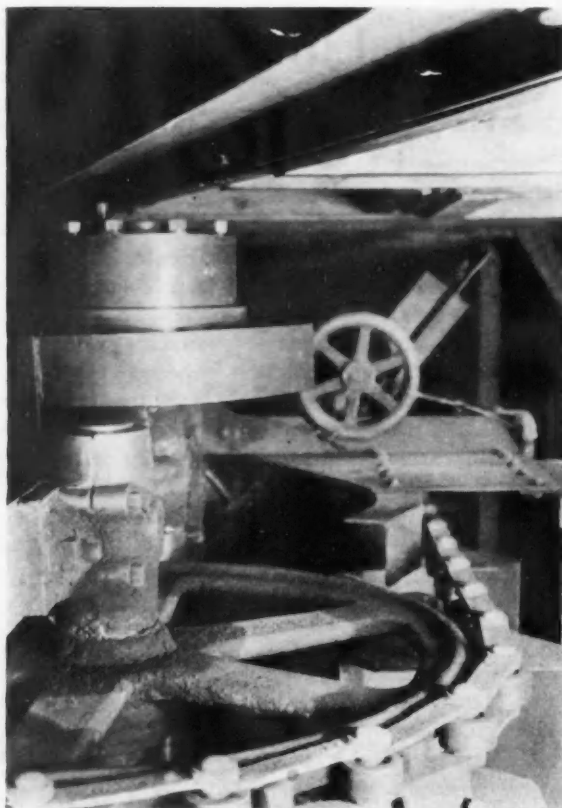
The clutch consists of a housing which is keyed or otherwise attached to a rotating part of the driving machine. An extension of the shaft of the machine being driven is fitted by means of a key with a special bushing which rotates inside the housing where it can be engaged by the pawl. This pawl is mounted on the inside of the housing and it is held in position by an adjustable load spring which can be sealed against tampering.

When the overload occurs for which the spring is set the pawl is quickly thrown out from engagement with the bushing and is locked in the open position by a reset lever.

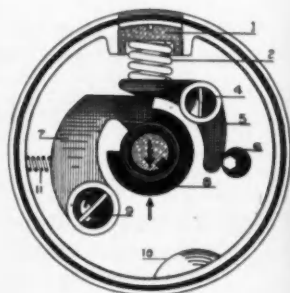
The driving machine then runs light, that is without friction except that due to its own characteristics. An automatic electrical device can be furnished to shut down the motor when the clutch throws out. To reset the clutch arrows marked on the housing and on the driven shaft must be brought to face each other. A 180-deg. turn on a cam throws up the reset lever permitting the pawl to drop and engage the bushing.

The pawl and the reset lever are made of case-hardened cast steel. The bushing is made of cold-rolled steel and the housing may be made either of cast iron or steel. A felt washer prevents dust from entering the housing where it fits over the driven shaft. These clutches are made for shafts from 5/16 in. to 8 in. in diameter.

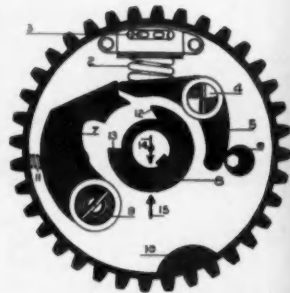
The Pennsylvania Pump & Compressor Co., Easton, Pa., has developed a method of maintaining hydraulic balance in its multi-stage type centrifugal pumps. The impellers of these pumps are arranged so that the suction inlets are opposed to each other. Where the number of stages is even, as in a four-stage pump, half of the impeller inlets face left hand, half right hand. In a three-stage pump, the suction inlet of one impeller faces left hand, the other two right hand. A feature of the design is a distance bushing placed between the two directly opposed impellers of a proper diameter.



The clutch housing, shown at the extreme left, is bolted to the hub of the driving wheel.



The driving pawl is held in position by a load spring.



An overload releases the pawl instantly and throws it into a locked position.

.. BE SURE OF RESULTS

USE THE STANDARD QUALITY GRADE

J & L STANDARD SPRING WIRE



J & L STANDARD Spring Wire may be worked into springs of the various sizes, shapes and tensions with a dependability which means much in economy and speed of production. It is the standard, high quality grade with nicely balanced strength, resilience, toughness and workability. No greater satisfaction in spring making may be had than through the use of J & L STANDARD Spring Wire.

Catalog data or specific information regarding J & L wire products is available without obligation on your part.

J & L WIRE PRODUCTS

Wire Rods
Cold Heading Wire
Basic and Bessemer Wood Screw Wire
Basic and Bessemer Screw Stock Wire
Standard Spring Wire
Bright, Annealed and Galvanized Wire
Bright, Galvanized and Coated Nails
Polished and Galvanized Staples
Galvanized Barbed Wire
Woven Wire Fence

J & L STEEL

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS

JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

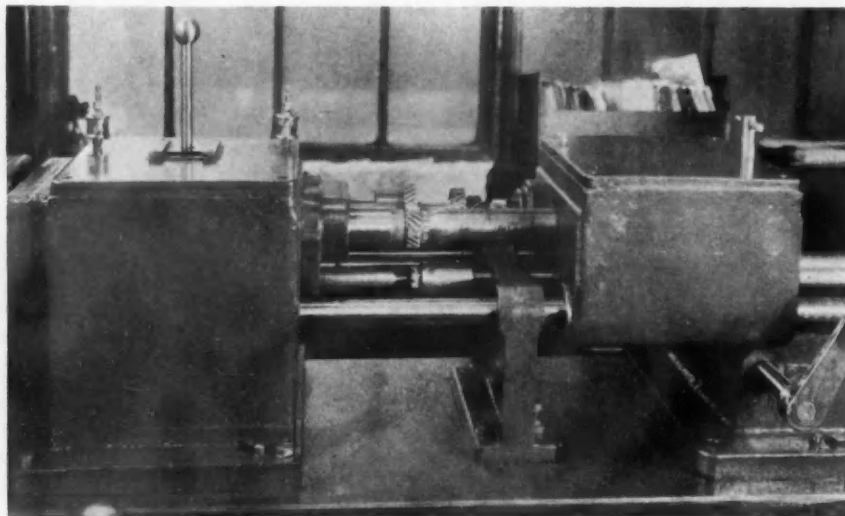
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Use of All-Helical-Gear Transmission Made Possible by New Equipment

(Concluded from page 537)

have been checked for lead, size, eccentricity and form. The test, which is similar to the service condition met by a gear when it is assembled in the transmission case, takes into account the working of the gear both during idling and when the brake is applied. The gear to be tested is rolled with a master gear at 900 r.p.m. by means of a 20-hp. reversible motor; this motor is of the sleeve type rather than ball-bearing, so that all sound is eliminated and any noise is concentrated in the gears being tested. The motor is mounted on four rubber pads at the left-hand side of the machine. The machine itself has a well-ribbed cast-iron base. The horizontal working spindle is on a sliding head and

er-type electric furnace for 9 hr. 20 min. Blanks are placed on trays; every 12 min. a tray is placed by the operator against the preceding one which is mechanically pushed its own length, thus discharging a tray at the finish end of the furnace. The various heating zones are held within 10 deg. F. of the required temperature by means of recording potentiometers which govern the heating elements in the furnace and record existing temperatures. The loading temperature is 1620 to 1660 deg. F., at which they are held for 1 hr. 15 min. By means of a blower, which brings down the temperature in the necessary furnace zone, gears are cooled to 1325 deg., where they are held for 3 hr. A



Gears are inspected for noise and to determine whether bearings are in the proper locations and heights on this Chrysler-designed running-in machine. Twelve per cent of all production work is subjected to this rigid examination.

is brought into position by a rack operated by hand and locked to a predetermined location. Twelve per cent of all production work is subjected to this rigid examination to insure absence of gear noises.

After gear teeth are cut they are inspected 100 per cent for eccentricity, being rolled with a master gear for size, runout and tooth form. They then go to a Bolender burnishing machine, where the tooth surface is lightly burnished. After lapping, gears are washed with Sonoco spirits, run through hot water rinse and matched for proper bearing and size on a special machine. They are rolled for correct backlash, and the sliding gears are fitted to the spline shaft. When gears are assembled in the transmission case the assembled product is tested for noise and eccentricity.

Gear blanks are annealed after forging by being put through a push-

gradual cooling of the gears follows until they are down to about 800 deg. At that point they are lifted from the furnace and placed in water to cool. The micro-structure resulting from this heat treatment is lamellar pearlite showing a Brinell hardness of 187 to 207. Scale is removed by pickling, after which the gears are inspected for hardness, and then sent to the gear cutting department.

After gears are finish machined, they are heated for 45 min. in a rotary electric furnace previous to hardening. They are loaded into the furnace at 2½-min. intervals, the furnace being at a temperature of about 1375 deg. F., and they emerge at 1480 to 1490 deg. At the unloading end of the furnace they are submerged for 1½ min. in a cyanide bath, after which they are quenched in oil. They are washed in hot water and placed in baskets which carry them through

the draw furnace at 400 deg. for 45 min. Following this they are wire brushed and checked for hardness, which must be within a range of 51 to 54 on the Rockwell C scale. The production method of checking is by means of a scleroscope with limits of 76 to 80. To prevent distortion, countershaft gears are inverted during quenching; that is, the small gears are down.

All transmission gears are made of a modified S.A.E. 6150 steel of the following analysis: Silicon, 0.10 to 0.20 per cent; sulphur, maximum, 0.035; carbon, 0.47 to 0.52; phosphorus, maximum, 0.030; manganese, 0.70 to 0.90; chromium, 0.80 to 1.00; and vanadium, minimum, 0.10 per cent.

R. F. C. Has Advanced Little for Construction

WASHINGTON, March 31.—Of the \$2,083,750,079.63 advanced in cash by the Reconstruction Finance Corporation up to the close of business on March 21, only \$19,682,000 had been disbursed for self-liquidating projects. Agreements had been made to advance \$186,395,683.39 to aid in financing 95 self-liquidating construction projects, according to the corporation's report, but \$862,784.37 of this had been canceled or withdrawn, leaving \$165,850,899.02 to the credit of borrowers.

Among the larger self-liquidating advances were \$13,000,000 to finance construction of a combined rail and highway bridge across the Mississippi at New Orleans; \$2,327,000 for a new water pumping station for Chicago and \$3,024,000 to the Metropolitan Water District of southern California for an aqueduct to carry water from the Colorado River to Los Angeles and other southern California cities.

The R. F. C. authorized 111 loans aggregating \$359,885,015 to 62 railroads, of which \$264,740 was canceled or withdrawn and \$328,592,114.57 was disbursed to the carriers. For completion of new rail construction, \$47,945,483 was loaned, while \$13,550,000 was loaned to the Denver & Rio Grande Western Railroad for construction and repair of equipment and the Dotsero cut-off.

E. F. Houghton & Co., with plants at Philadelphia, Chicago and Detroit, will manufacture and sell the products formerly made by Weaver Brothers Co., Cleveland. J. C. Weaver, formerly vice-president of the latter company, is now manager of the cleaner and pickling products department of E. F. Houghton & Co. Weaver Brothers' products include pickling inhibitors, pickle pills for testing the strength of acid and alkaline solutions, Tanktite, a plastic, acid-resisting lining for tanks, and several other products used in the pickling of all types of metals.